

THE IRON AGE

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Cutting the Cost of Cupola Charging

What the Modern Foundry Co. Has Accomplished with an Electric Elevating Platform Truck Equipped with a Beam Scale

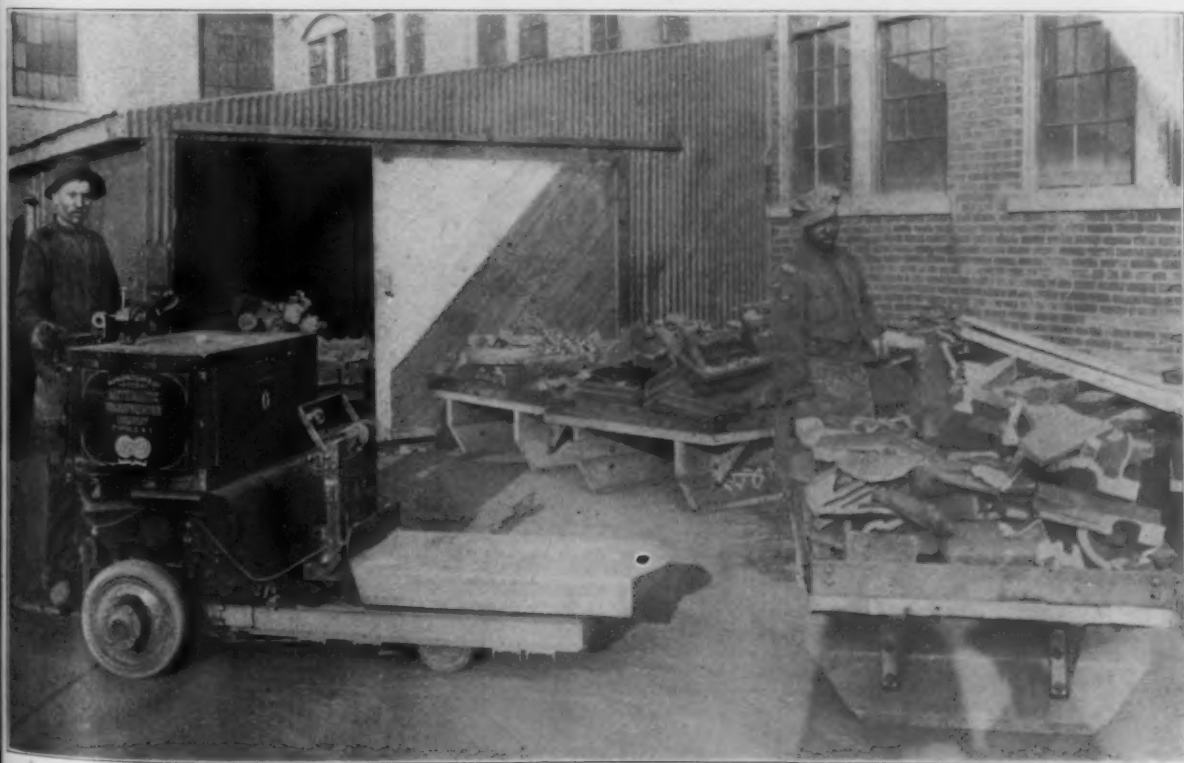
AS a general rule operating costs inside a foundry have heretofore received almost exclusive attention, while the question of the saving to be effected on the outside has been given comparatively scant consideration. The Modern Foundry Co., Oakley, Cincinnati, has lately made some experiments with a view to reducing its yard expense. One of these is the employment of an electric elevating platform truck built by the Automatic Transportation Co., Buffalo, and redesigned by its Cincinnati sales engineer, C. E. Ogden, who added a scale attachment.

A sufficient number of platforms are provided and in charging the cupolas the operator of the truck picks up an empty one, conveying it to the scrap or pig-iron pile, where the requisite amount of material is loaded. With a beam scale on the truck it is only necessary for the operator to set the scale for the desired amount of metal, and as soon as this is loaded on the platform it is conveyed to an elevator that carries it to the cupola platform. A Stuebing hand-lift truck is used on the charging platform for

removing the load from the elevator and conveying it to the charging doors of the cupola. This arrangement does away with the necessity for the electric truck to remain on the elevator to remove the load at the top.

The labor saving effected in the yard is estimated around 50 per cent over the former method of handling pig iron and scrap. The foundry company also states that a great advantage of the system is that the proper proportion of pig iron and scrap is obtained without the usual delays in weighing the material. A small electric light is provided to assist the operator in making a correct reading of the truck load on the scale beam when the truck is used at night. The necessary current is supplied from the storage batteries that operate the truck. The batteries are charged at night or at any other time when the truck is not in use.

The truck is the four-wheel type with a wheel-base of only 51 in., so that it can be turned in a very small amount of space. The lifting mechanism is operated by an individual motor. The truck has a



The Use of an Elevating Platform Storage Battery Industrial Truck Equipped with a Scale Beam Capable of Reading from $\frac{1}{2}$ to 4200 Lb. Is Claimed to Have Effected a Material Reduction in the Cost of Cupola Charging at the Plant of the Modern Foundry Co.

capacity of 2000 lb. and can be operated at a speed of from 7 to 8 miles per hr. The scale is capable of weighing from $\frac{1}{2}$ to 4200 lb. The truck has also been found convenient in handling castings and conveying them to different parts of the foundry where wanted.

LABOR CONSCRIPTION

Secretary Wilson Does Not Believe That It Will Be Necessary

WASHINGTON, Dec. 11.—The possibility of labor conscription to render more effective the prosecution of the war, the policy of the Government in the treatment of disputes during the war, and the attitude which employers and employees should assume toward each other with a view to minimizing all forms of labor disturbance, are the leading topics discussed in the annual report of Secretary of Labor Wilson, which has just been made public here. The Secretary defends the right of wage earners to organize and deprecates the efforts of employers to prevent such organization, declaring that if workers were not prevented from uniting, labor disturbances could be better controlled through the pacifying influence of conservative and responsible leaders.

Mediation Under War Conditions

"The number of labor disputes calling for Government mediation increased suddenly and enormously with the beginning of the war," says the Secretary. "A majority of the employers and employees involved in industrial controversies evinced a keen desire to secure the good offices of the Department of Labor through its conciliators and to take advantage of the machinery created under that section of the organic law of the department the purpose of which in this field of its activities has been the fostering of industrial peace on a basis of industrial justice. During the four years the Division of Conciliation has been in existence, the foundation has been laid to aid materially in the quick adjustment of such disputes. It had been demonstrated that the intervention of an impartial third party in the person of a conciliator approved by the department invariably has expedited the settlement of a dispute which had culminated in a strike or a lockout. In a large number of instances, the conciliators have been able not only to bring about agreement in cases of existing differences—often arising from misunderstandings—but to avert the threatened strike altogether.

The magnitude of the conciliation work from the beginning of the war to the date of this report is shown by the fact that, since war was declared on April 6, 1917, the Department of Labor had assigned "commissioners of conciliation in 521 new cases made up of 281 strikes, 212 disputes that threatened a suspension of work, and 28 lockouts. It has been successful in satisfactorily adjusting 323 of these; has been unable to adjust 43; has 104 cases pending, a comparatively small number of which have reached the strike stage; and in 51 cases its commissioners found on their arrival that the matters in dispute had been settled or that the plant was in operation and the former employees had secured work elsewhere. The number of employees directly affected in the labor disputes settled by the department's conciliators or pending and in process of adjustment since the declaration of war—April 6, to Oct. 25, 1917—total 572,029, while approximately 380,954 were affected indirectly.

Organization of Labor

With the coming on of the war, traditional cleavages between employers and wage earners were accentuated. Rights of wage earners to organize, which some employers have conceded, others have opposed, although Secretary Wilson declares that this opposition has subsided as war conditions have developed.

"The explanation of those who oppose labor organization," the report continues, "is to the effect that if labor organization were permitted in their establish-

ments, excessive and unreasonable demands would follow. To this it is replied that if workers were not prevented from organizing abuses of organization could be better controlled."

Conscription Not Necessary

Concerning conscription of labor, the Secretary says: "Should industrial conscription become really necessary in order effectively to prosecute the war, a policy less likely to be considered one-sided would be desirable. It would seem—that is, if workers were to be conscripted for industrial purposes—that the working opportunities to which they were assigned ought to be commandeered, so as to make such workers not coerced servants of employers but employees of the Government itself.

"There is, however, no reason for apprehending a necessity for any kind of labor conscription in order to settle or prevent disputes between employers and their employees which may interfere with a vigorous prosecution of the war. In every case in which responsible representatives of disputing employers are willing to negotiate considerably with responsible representatives of conservative labor organizations which represent their disputing employees in the spirit in which they would negotiate with business competitors, labor disputes can be settled speedily, effectively, and without friction through the mediation service of the Department of Labor. By simple and fair systems of collective bargaining between the Government, labor organizations, and business organizations, all labor disputes prejudicial to an effective prosecution of the war can be promptly eliminated from war problems. Not only can this be done, but it can be done to the satisfaction of all concerned and in harmony with every patriotic purpose.

"Our greatest need is the spirit of self-sacrifice for the common good—a sacrifice of our pride, sacrifice of our prejudices, sacrifice of our suspicions against each other, sacrifice of our material comforts, sacrifice of our lives, if need be—to carry on unimpaired the democratic institutions handed down to us by our fathers."

Largest Lake Ore Shipments for November

Iron-ore shipments down the Lakes from the Lake Superior region in November were the largest ever recorded for that month. The total was 7,333,828 gross tons as compared with 5,715,452 tons in November, 1916, an increase of 1,618,376 tons or 28.31 per cent. The Duluth and Two Harbor ports and the Great Northern dock all made large gains over November last year. The following table gives the November and season shipments by ports, and the corresponding figures for 1916 in gross tons:

	November, 1917	November, 1916	To Dec. 1, 1917	To Dec. 1, 1916
Escanaba	838,096	772,417	7,000,870	7,279,899
Marquette	327,113	273,801	3,197,213	3,820,452
Ashland	900,241	665,339	7,503,479	7,935,185
Superior	1,516,162	1,132,642	13,769,433	12,626,473
Duluth	2,583,620	1,982,872	20,270,617	21,455,345
Two Harbors	1,168,596	888,381	9,845,814	10,530,944
Total	7,333,828	5,715,452	61,587,426	63,648,298
1917 increase	1,618,376			
1917 decrease			2,060,872	

To Dec. 1 this year the total of 61,587,426 tons is 2,060,872 tons, or 3.23 per cent less than the record total of 63,648,298 tons to Dec. 1, 1916. The Duluth percentage of the total to Dec. 1 was 32.91 per cent, as compared with 33.71 per cent a year ago. That of the Great Northern Dock, however, was 18.50 per cent this year, or greater than its 17.20 per cent share of the total by 1.30 per cent.

A fleet of 22 White trucks are operated for general freight haulage between New York and Philadelphia and to other cities by the Beam-Fletcher Corporation, Philadelphia. They leave Philadelphia at 8 o'clock at night to reach New York at 6 a. m. and another group leaves New York at 5 p. m. due to reach Philadelphia at 3 a. m.

Combination Bolt Washer and Locknut

A new type of locknut that is a combination of a bolt, washer and nut, is being placed on the market by the Permanent Products Co., Engineers' Building, Cleveland. Among the important features claimed for this nut are its simplicity in construction and application, and that it does not require an extra length of bolt or an extra nut. The bolt is similar to a standard bolt except that it has tapered grooves on opposite sides, these grooves gradually lessening in depth from the end of the bolt and extending to a point slightly above the threaded portion. The washer has two inner lugs that fit the grooves on the bolt. The nut has a chuck on each of its lower edges.

In application the washer is slipped on the bolt to a point where the inner lugs come in contact with the base of the tapered grooves. The nut is then applied and this comes in contact with the washer, which is forced back, if necessary as far back as the end of the threaded portion of the bolt. The tapered grooves cause the washer to bind equally in the base of the grooves on both sides thus anchoring the washer without engaging the threads, and allowing the nut and washer to be applied in complete contact with the parts being bolted regardless of any variation in the thickness of the bolted parts and to be locked in that position. The nut is locked by upsetting the outer edge of the washer into any one of the chucks on the nut with a chisel. The nut can be easily unlocked by forcing back the upset portion of the washer.



Tapered Grooves in the Sides of the Bolt Receive the Internal Lugs on the Washers of a New Combination Locknut and Avoid Engagement with the Threads for Locking

Eight Thousand Men Wanted for Navy's Air Service

For the further extension of the aviation branch of the United States Navy, Secretary Daniels has authorized the enlistment of 8000 young men and in doing so has opened up most attractive opportunities in this new and unusually appealing service. There is an important and immediate need for mechanics for Naval aviation for the ratings of machinists' mates, carpenters' mates, quartermasters, coppersmiths and blacksmiths. These men will not be enlisted for pilot's duties but coming into the service with a general mechanical turn and a liking for the work they will receive a special and unusual training for the building, handling, repairing and overhauling of the Navy's air craft. Succeeding in this they will be used as the ground personnel of the flying corps.

The requirements for enrollment will be the same as those for the regular service of the United States Navy. Training for machinists' mates and quartermasters will last about three months. Carpenters' mates will train for approximately six weeks. On completion of training course the provisional landsmen, after examination, will be rated first or second class petty officers on the basis of examination and all around ability. After getting a rating, they will be eligible for promotion to the next higher grade if they show fitness and pass the necessary examination.

The Philadelphia Foundrymen's Association held its monthly meeting at the Manufacturers' Club, Philadelphia, Wednesday evening, Dec. 5. D. S. Apeldorn of Apeldorn & Beatty, representing a gas engine manufacturing company, talked on gas for power, lighting and drying cores. The Electric Furnace Construction Co., Finance Building, Philadelphia, was proposed for membership.

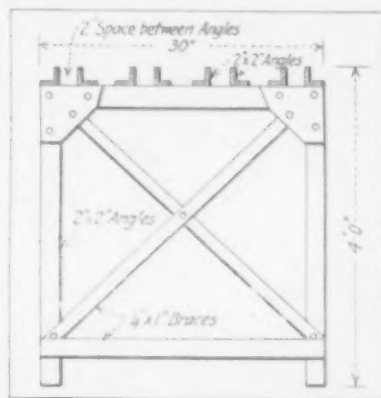
Rack for Hammers, Cutters and Sledges

In the plant of the Youngstown Sheet & Tube Co., Youngstown, Ohio, hammers, cutters and sledges when not in use are kept in a rack that is made of angle iron. The rack was developed by the rigger foreman who has charge of these tools. Only tools which are safe to use are kept in the rack, and emphasis is laid upon the importance of arranging the tools in an orderly fashion.

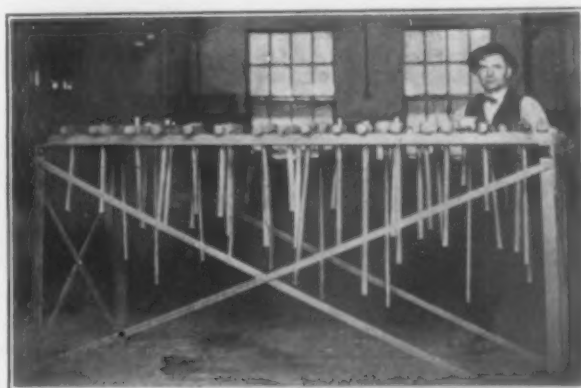
The maintenance of this rack, according to J. M. Woltz, safety director of the company, has eliminated to a great extent accidents

resulting from the usage of improper cutters and hammers. Tools that have mushroomed heads or dull edges are kept in a separate pile and taken to the shop to be redressed before being placed in the rack. Other advantages resulting from the installation of the rack are the ability to pick out readily any special kind of cutter, diamond point or sledge that may be required, thus enabling the output of the plant to be increased by just that much. Inspections of the tools by the shop foreman or tool boss can also be made thoroughly and at frequent intervals.

The dimensions shown in the end view, while those of the rack of the Youngstown plant, are merely suggestions, it being possible, of course, to make the rack



An End View of the Rack, the Dimensions of Which Can Be Varied If Desired



An Angle Iron Rack for Hammers, Cutters and Sledges Insures an Orderly Arrangement of These Tools and Facilitates Their Inspection and the Elimination of Those Having Mushroomed Heads or Dull Edges

wider or longer should conditions in another shop render this desirable and the spaces between the angles supporting the tools can be varied to accommodate different sizes.

Improving Cast Iron with Uranium

By alloying uranium with cast iron or semi-steel the strength and toughness of the metal is increased, as well as the fluidity, according to a patent (U. S. 1,247,252—Nov. 20, 1917) granted to Joseph M. Flannery, of Pittsburgh, and assigned to the Standard Chemical Co. of that city. The quality of the iron for machinery is claimed to be enhanced and the resistance to wear increased. The new alloy is made by adding uranium to the molten iron as uranium metal or as ferrouanium, so that the finished product will contain from 0.05 to 1 per cent of uranium. The addition of this element is said to deoxidize and denitrogenize the metals, increasing the tensile strength and producing a fine-grained product.

WAR ORGANIZATION

Centralization of Administrative Authority Advocated—Grave Condition Demanding Leadership

At a meeting of the Taylor Society, organized to promote the science of management, held at Washington, Dec. 8, an address was made on the special need at this time to win the war of a co-ordinated working organization. It was made by Henry P. Kendall, member storage committee, War Industries Board, Council of National Defense; treasurer Plimpton Press, Norwood, Mass.; president Lewis Mfg. Co.; treasurer Slatersville Finishing Co., and the following is an abstract:

The problem of mobilizing and training a fighting organization is not an industrial problem except as to general principles of organization. The rapidity of the mobilization and training, however, depends very largely on the thoroughness with which the industrial aspects are handled.

Auxiliary Departments

The plan must provide for the complete organization of every unit, and the co-ordination of units without overlapping, and must bring the control of the different divisions and their sub-divisions and auxiliary departments directly to the desk of the Secretary of War. By auxiliary departments, I refer to such things as the formulation and control of standards, the control of transportation and purchasing, of finance and accounts, of priority, statistics, labor, personnel, etc. Such departments would tend to standardize and co-ordinate their particular kinds of work in each regular division, such as a supply division like the engineers or the signal corps. An auxiliary department would carry on the super-planning and control of what in each supply division would correspond to an independent function.

It is obvious, for instance, that the purchasing of food supplies for the quartermaster's department should be handled by men expert in that line who would be a part of the quartermaster's department, but because purchasing involves transportation and priority, it should have a super-control in an auxiliary department. This does not weaken the effectiveness of any supply division, but serves to co-ordinate it.

How They Would Bring Results

The men handling the auxiliary divisions should be men with the broadest kind of experience and vision who understand and work with the general principles rather than with specific commodities. The same principle would hold true of transportation and of the other auxiliary functions. Standard practices should be worked out, but a compromise with existing practices effected where necessary. The transportation system of the country will be taxed to its limit. The movement of goods and troops will require the most careful scheduling.

The storage facilities of the country are already overtaxed. Great assembling depots at industrial centers, to act as reservoirs, from which through car and train-load shipments could be made to the terminal ports, with assembly stations at these points, should be placed under such control that full cargoes could be assembled at the wharves for the steamer before its arrival. There should be such centralized control, including the scheduling of the steamers and their cargoes for all ports, that the military has simply to requisition from the various supply divisions according to their needs with the knowledge that their requisitions will be promptly filled.

Transportation and storage require perhaps the largest new organization developed in the war and because these two form the neck of the bottle, they become two of the most important problems. They are auxiliary departments. Each supply division and sub-division should be completely manned and completely organized under functional control. The auxiliary departments should control these for the purpose of co-ordination and interrelation.

It is obvious that in the quartermaster's department, men buying textiles should be familiar with the textile industry and market practices and conditions. It is obvious at the present time different supply divisions should not compete through their separate purchasing departments on cotton duck. The equipment of the country has already been scheduled and is under control. It is obvious that the purchase of munitions is highly technical and requires men of special training. The purchase of drugs and medical supplies is also a specialized field. The transportation, storage, finances, and accounts, and standards of the supplies common to all must be subject to interdepartmental control. The same principles would also apply to building contracts, the sources and supply of labor, wages, and the selection of the personnel for the rapidly growing governmental departments. Such a combination of functional responsibility within each division and sub-division, all building up to a final control, requires imagination, experience, vision, and great wisdom now. Such work cannot be entrusted to any but the ablest minds of demonstrated capacity.

No Time for Democratic Evolution of Organization

In time of a hurricane at sea, even when the signs have been recognized and all possible preparation made, there comes a time when the accumulated experience of a lifetime on the part of the captain, the officers and men of the crew is put to a crucial test. This accumulated experience may never before have been given a test in the lives of any, but there can be no faltering. There must be a constant and effective control. Each function must work properly and no time can be allowed for training, coaching or trying experiments.

To-day, the signs of three years have been wrongly interpreted. The hurricane has broken. We have abundant men on deck and below decks to form a perfectly working crew to handle every rope and every gear. We have no time for the bumping along and arriving at organization through the previous methods of a democratic evolution. Strong men of vision must be put into the controlling positions. The spirit of the crew, thanks to democracy, is fine. They will take responsibility. To organize them will call for the finest spirit of democracy with the keen insight of science of organization to determine the one best way. If the plan is not soon made, our men may be holding to the life lines to be kept from being washed overboard at the time when they should be manning the ship. The spectacle of the men who are to-day carrying the loads in Washington and elsewhere is a great tribute to democracy. The best of democracy with the best organization which an autocracy can plan, which the spirit of science will work out, must be developed.

The first electrically driven reversing mill installed in South Wales, according to the *Iron and Coal Trades Review*, London, has recently been put in operation at the Monmouthshire Steel & Tinplate Co.'s works. The mill is designed for a maximum output of 40 tons per hr. of tin-bars, 8 by 7/16 in., weighing 12 lb. per ft., this bar being rolled from a 1600 lb. ingot 11 1/4 x 9 1/2 in. in section, 10 passes being taken in the blooming mill and five in the finishing mill. The maximum rated intermittent capacity of the reversing motor is 5300 hp. with variable speed up to 180 r.p.m. in either direction. The flywheel set is driven by a 1800-hp. motor at a speed of 500 r.p.m.

The general offices of the U. S. Reduction Co., whose works are at East Chicago, Ind., have been moved from Chicago to East Chicago. The change was made with the idea of having the plant and offices in the same location. The company will still maintain a local sales office in Westminster Building, Chicago.

The Carroll Steel Co. has moved from 120 Broadway to larger quarters in 15 Park Row. Andrew T. Hines, formerly purchasing agent of the General Vehicle Co., Long Island City, and the Steel Producers Export Co., New York, is general manager of the New York office.

Organization of the Western Electric Co.*

Ideal Is Highly Developed Functional Management with Adequate Central Control—Units in 41 Different Cities

BY H. A. HALLIGAN

LOOKING back over the life of the business of the Western Electric organization, now in its forty-sixth year, we see that it has been a steady growth and evolution away from decentralized control toward functional management with a central control. With a decentralized scheme of control, it is undoubtedly possible to carry on a large volume of work with an untrained force. As the force becomes better trained, specialists find their way to the front. Recognizing their ability, the executive looks about for the widest possible use in his organization for the services of these experts. Here is the beginning of a trained personnel which may lead to a staff and line organization or to a pure functional organization. In either event, there must be a central control of the executive work in order to attain that greater economy and efficiency which is the goal of our ambition. A management may be so decentralized that there is little or no relationship or co-ordination among the parts themselves and between the parts and the executive. On the other hand, I have seen control so centralized that the units cannot even buy a pound of tacks or a paper of pins in an emergency.

Delegating and Defining Authority

For our own organization, we believe in central control over departments divided according to their respective functions, but with authority for action within the departments delegated to responsible subordinates as many steps down the line as possible.

We adopted the general theory that the responsibility and the authority of each executive must be clearly established. For this reason, we have our organization record, which is a statement of the duties, scope and functions of each general department. It includes charts for each department, showing the names of those in charge and their lines of authority and responsibility. In certain cases the descriptions of duties are supplementary, and in some cases they explain advisory relations and relations not involving direct authority and responsibility. Similar records exist within the departments, so that each individual in the employ of the company may have his place and may know what his relations should be to those about him.

Having thus located the persons making up the organization in their places in the plan, we undertook to define broadly the policies of the company as a guide for action to the executives throughout the country. This is in line with our policy that executives must be thoroughly grounded in the fundamental policies as a basis for forming sound judgments which they must make upon their individual responsibility. To carry out this purpose we have what is known as a series of general instructions, which set down our policies on such subjects as:

- Employment and leave of absence.
- Employees' pensions, disability and death benefits.
- Employees' changes in rates of pay.
- Standards of service.
- Complaints and claims.
- Reports required.
- Execution of contracts and bonds.
- Matters requiring action of board of directors.

Next, it is of equal importance to safeguard the relations with employees. The employee must be sure of a square deal. He must be certain that promotion is based on efficiency. There must be neither nepotism

nor favoritism, and the best man must invariably get the job.

We believe that the trained employee is the best investment to the company. To that end we select our people with the greatest care, having a highly organized plan for this purpose. Recognizing that a sound body is a prerequisite to skill in any form of work, we subject each applicant to a physical examination. Having qualified for a position and been assigned to one, we then afford these young men and women many opportunities for self-improvement through the company's educational facilities.

General Scheme of the Organization

The organization itself is one with a general executive department, with the work subdivided among seven functional departments, namely: Sales, engineering, purchasing, manufacturing, accounting, treasury and legal. These departments control their respective functions throughout the company and delegate authority for action down the line. This plan is applied to a working force of 30,000 employees, of which the largest units aggregating about 20,000 employees are located at one place. The remainder are located in 41 of the principal cities and elsewhere throughout the United States.

The sales department is responsible for the execution of the commercial policy of the company, for the kind and quantity of articles manufactured and the quantity of merchandise bought for resale. It determines the selling prices, has charge of the advertising and renders service to customers from its warehouses throughout the country.

The engineering department is responsible for the design of all apparatus manufactured by the company, and also has the final responsibility for the quality of the product manufactured.

The purchasing department oversees all purchases and conducts the company's relations with its principal suppliers.

The manufacturing department is in charge of the company's manufacturing plant and its operation.

The comptroller has oversight over the accounting work of all departments and acts as auditor of the funds placed with the treasurer.

The treasury department has charge of the funds of the company and the credits and collections from customers.

The legal department guides the company's course of business in accordance with the requirements of the law and is in charge of all matters of contracts and taxation.

Relation of Sales to Other Departments

The sales department is organized on a staff and line basis. The general executive of the sales department is surrounded by a staff of sales specialists, experts in the marketing of the articles which we sell. He also has reporting to him an administrative assistant who is the executive of the line organization composed of the sales offices and distributing warehouses throughout the country. This executive has a staff of specialists in the different branches of his work, who are occupied in devising improved methods of work, teaching the personnel of these local houses and inspecting the results of their performances from time to time.

The line organization of the sales department is made up of these sales offices and distributing warehouses, each in charge of a manager responsible for

(Continued on page 1467)

*From a paper read before the Taylor Society, Washington, Dec. 8. The author is vice-president of the Western Electric Co.

Trade Commission for Contract Abrogation

Would Overturn the Steel Industry in Particular and Give Control of Prices to the President—More Industrial Investigations

WASHINGTON, Dec. 11.—An urgent recommendation for the passage of the Pomerene bill specifically authorizing the President to fix prices in the iron and steel industry and, if necessary, to control the distribution of its products is contained in the forthcoming report of the Federal Trade Commission, coupled with an expression of belief that the public welfare demands the abrogation of many of the existing contracts. The commission also urges the importance of a permanent record of the work now being done by the semi-official advisory committees representing the various industries, one of the chief functions of which is the arranging of purchases of war material. An appropriation to enable the commission to secure detailed information concerning the operations of corporations engaged in the production of basic materials is asked, and it is suggested that if an adequate sum be granted much data of value to the consuming public could be collected and distributed.

Cost Investigations in Iron and Coal

"Just before the close of the fiscal year ended June 30, 1917," the commission says in referring to its investigation of the iron and steel industry, "the President called upon the commission for assistance in ascertaining the costs of production of various materials for the Government in the prosecution of the war. Only a little work on this subject was done before the end of the fiscal year, which was chiefly in connection with the costs of steel and lumber for shipbuilding and of coal for the Navy. Since then the work has been greatly expanded and has been made to cover practically entire industries whether all the producers were engaged in supplying the Government or not. This was due to the policy of the Government, in insisting on reasonable prices for its own purchases, to procure them also for the public. In the case of fuel, particularly coal, the establishment by law or agreement of a general price regulation for such commodities has made this course necessary.

"In the ascertainment of costs of production of coal and with respect to other data regarding the coal industry, the commission has worked in close co-operation with the Fuel Administration. For most products, however, the prices are not fixed by law but by voluntary agreements with the producers. In respect to such products the commission has ascertained and is continuing to ascertain costs and other data for the use of the President, but has not been charged with the duty of negotiating prices. Among the chief commodities for which costs have been and are being currently obtained are coal and coke, iron ore, iron and steel products of numerous kinds, various petroleum products, particularly fuel oil and gasoline, lumber, especially for shipbuilding, cement, firebrick, copper, lead, zinc, aluminum, nickel and certain other metals or alloys, including in some cases finished manufactures thereof, and certain food products required by the Army and Navy, especially certain canned food products.

For Government Control of Steel Prices

"The experience of this Government in the question of fixing prices is one that has been carefully followed by the commission, which has furnished extensive data for this purpose to the Fuel Administration and to the War Industries Board. The commission has also had

under consideration the experience of other countries in this matter, and particularly England and her colonies, France and other Allies. It is convinced that price fixing by authority of law will have to be extended to other products than food and fuel, and that such authority is preferably exercised with respect to the iron and steel industry, for which a bill has already been introduced in the Senate. Equally important, in its opinion, with the fixing of reasonable prices is the regulation of the distribution of the raw materials and intermediate products in the industry affected and of the distribution of the final products to the consumer. In this connection also should be considered the question whether bona fide contracts made prior to the passage of a price-fixing law should be allowed to be enforced. This commission is of the opinion that the exact merits of the proposition might differ somewhat in different industries. With respect to the iron and steel industry, however, it believes that the greatest public advantage would be attained by not allowing such contracts to be fulfilled, at least over long periods of time. In the case of coal, it is the opinion of the commission that the continued fulfillment of long-term bona fide contracts of sale made prior to the enactment of the law would militate against the most successful operation of price fixing by the Government."

To Check Intercompany Stockholding

An interesting statement is made in the report, of the scope of the investigation which has been planned pursuant to a provision of the Clayton act containing certain prohibitions against intercompany stockholding and interlocking directorates. The law charges the commission with the enforcement of these provisions, but no adequate appropriation for the purpose has been made. In urging that Congress provide the funds necessary for this work the commission says:

While the commission has in some instances intervened to prevent suspected projects in violation of these provisions, it is obvious that unless some systematic investigation is made of the conditions many violations of law will escape observation or detection. The commission therefore directed that a preliminary investigation should be made of the general situation in so far as the available published sources of information were concerned as a basis for a more thorough study of this matter. Comprehensive and up-to-date information on this subject is hardly attainable without a systematic requirement for corporation reports covering these relations followed by a careful study of such data to determine whether the relations so discovered bring the parties in question within the prohibitions of the statute.

In the case of intercompany stockholding, it should be noted, the prohibition applies to cases "where the effect of such acquisition may be to substantially lessen competition between the corporation whose stock is so acquired and the corporation making the acquisition, or to restrain such commerce in any section or community, or tend to create a monopoly of any line of commerce." A similar rule is made against a holding company acquiring the stock of competing corporations. With respect to interlocking directorates the prohibition applies only to certain corporations where any one of them has a capital stock, surplus, and undivided profits aggregating more than \$1,000,000, and then only in case the companies so related "are or shall have been theretofore, by virtue of their business and location of operation, competitors, so that the elimination of competition by agreement between them would constitute a violation of any of the provisions of any of the anti-trust laws."

It is evident, therefore, that in addition to a very comprehensive survey of these relations between corporations it would be necessary to examine particular cases with great care, both economically from the standpoint of their com-

petitive situation and legally from the standpoint of the applicability of the anti-trust laws under the circumstances found to exist. This work, therefore, is large in extent and would involve a greater expenditure than the funds hitherto available to the commission would make possible in view of the various other duties imposed upon it by law. Adequate provision for the enforcement of these provisions of law is obviously necessary.

To Sift Out Overdone Industries

The desirability of a comprehensive general survey of the operations of corporations and of a more particular examination of those which are engaged in the important and basic industries of the country is urged by the commission. With respect to a general survey of corporations the commission points out that it would be of great utility to the Government and to the general public, including the business world, to have a more complete record of the financial results and conditions in each industry. Accurate data, for example, regarding the extent of investment and the average profits in the various industries, the commission believes, would tend to prevent the undue development of those in which profits are unreasonably low and to encourage investment in those in which they are inordinately high. Such a result would be of great benefit not only to the business world, but to the public generally. At the same time data should be obtained regarding the output of each concern and its relations with other companies which would be of assistance in the investigations of intercompany stockholding and interlocking directorates.

Data on Particular Industries

An unsuccessful attempt has been made by the commission during the past year to obtain on a voluntary basis brief reports from manufacturing concerns classified by industries. It was intended after compiling these returns to send to each concern reporting a statement of the combined results of the inquiry with respect to the industry in which the reporting concern was interested. While the questions asked were such that, in the commission's opinion, every manufacturing concern should be able to answer them without difficulty and with little or no labor the returns were disappointing. In a large proportion of cases they were incomplete and in frequent instances of doubtful accuracy. In view of these facts the commission felt constrained to withhold the issuance of the combined statements originally planned. The work proved to be of considerable value, however, as indicating the desirability of more intelligent accounting methods in business and also proved that if the commission attempted to organize any system of reports from corporations generally it would have to begin on a very modest scale as to the scope of information required, and that if for particular basic industries it was desired to have really comprehensive data it would be necessary to organize the work slowly and after going carefully over the whole plan with the producers themselves. To carry this work further will require a considerable appropriation which the commission urgently recommends.

In this connection it suggests the desirability of amending the Federal Trade Commission act in those provisions which relate to the power of the commission to require reports in such a manner as to make it explicit that reports may be demanded from individuals engaged in commerce as well as from corporations.

New Limit on Interlocking Directorates

Since the convening of Congress on Dec. 3 the Judiciary Committees of both the Senate and House have decided to report with a favorable recommendation resolutions postponing until Jan. 1, 1919, the effective date of section 10 of the Clayton act which forbids interlocking directorates of railroads and manufacturing

concerns. The effective date of this section has been postponed twice, and, in the absence of further legislation, it would go into force Jan. 8, 1918. The matter is of very general interest to the readers of THE IRON AGE, as a number of the railroad directorates aimed at by the Clayton act are made up in part of leading men in the iron and steel industry. It is probable that the resolutions will be finally passed before the holiday recess.

W. L. C.

MILLIONS FOR WAR

Very Large Appropriations Will Be Asked— Heavy Guns for France

Estimates submitted by the Secretary of the Treasury at the beginning of the new session of Congress last week call for appropriations of more than \$13,500,000,000 for the fiscal year beginning July 1, next, of which more than \$11,000,000,000 in round figures will be required for actual war purposes, an amount \$2,000,000,000 in excess of the corresponding appropriations for the current fiscal year. Inasmuch as the total appropriations for all purposes for the current year have exceeded \$18,000,000,000, it is altogether probable that supplemental allotments aggregating several billion dollars will be requested during the new fiscal year.

The war estimates include no less than \$6,615,936,000 for the military establishment, \$3,504,918,000 for fortifications, and \$1,014,077,000 for the navy. The enormous appropriation for the military establishment contemplates the maintenance of an army of 1,500,000 men whose pay will aggregate \$1,804,000,000. Under the head of the Ordnance Department are included the following large items: General ordnance stores, \$25,500,000; manufacture and purchase of ammunition for small arms, \$390,000,000; manufacture and purchase of ammunition for practice and instruction, \$75,200,000; manufacturing, procuring and repairing small arms, \$50,000,000; repairing ordnance and stores, \$93,400,000; purchase, manufacture and repair of automatic machine rifles, \$237,144,000; purchase, manufacture and repair of armored motor cars, \$75,550,000. These figures are considerably in excess of the appropriations for the current fiscal year.

The estimates covering the manufacture and purchase of heavy guns for use in France are carried under the general head of "fortifications" although they are disbursed under the direction of the Chief of the Ordnance Bureau. They include the following items: Purchase and manufacture of mountain, field and siege cannon, \$2,897,000,000; purchase and manufacture of seacoast cannon for coast defense, \$12,200,000; purchase and manufacture of ammunition for seacoast cannon and for modernizing projectiles on hand, \$6,060,000; for alteration of mobile artillery, including the purchase and manufacture of machinery, tools, and materials, \$310,500,000; purchase and manufacture of ammunition, sub-caliber guns and their accessories for mountain, field and siege artillery, \$93,000,000. The total estimates for fortifications represent an increase of \$1,155,000,000 over the appropriations for the current year.

The enormous appropriations made last summer for the navy, which have not yet been expended, have enabled the Navy Department to reduce certain of its estimates, although some of the largest items show big increases. The total amount estimated for the pay of the navy for the fiscal year beginning July 1, next, is \$213,239,000 as against \$126,532,000 for the current year. The estimate for expenditures on account of naval aviation calls for \$94,000,000, an increase of more than \$30,000,000. Other important items include the following: procuring ordnance material, \$25,594,000; machinery and equipment for gun shops for the Washington naval gun factory, \$2,500,000; new batteries for ships of the navy, \$38,309,000; ammunition for vessels, \$32,686,000; torpedoes and appliances, \$1,000,000; reserve ordnance supplies, \$33,000,000; ma-

chinery for war vessels, \$50,000,000; completion of vessels now building, \$60,000,000, coal and other fuel, \$48,400,000.

Under the heading of public works, the Navy Department asks the following appropriations for various yards and stations: Portsmouth, N. H., \$489,000; Boston, \$75,000; New York, \$1,600,000; Philadelphia, \$2,400,000; Washington, \$40,000; Norfolk, Va., \$3,450,000; Naval Academy, \$2,275,000; marine recruiting station, Port Royal, S. C., \$100,000; Charleston, S. C., \$1,400,000; Key West, \$25,000; New Orleans, \$450,000; Mare Island, Cal., \$1,200,000; Puget Sound, Wash., \$200,000; Tutuila, Samoa, \$50,000; Guam, \$100,000; Guantanamo, Cuba, \$200,000; naval magazine, Hingham, Mass., \$30,000; Indian Head, Md., proving grounds, \$160,000; Iona Island, N. Y., \$18,000; Fort Lafayette, N. Y., \$26,000; torpedo station, Newport, R. I., \$250,000; additional torpedo and ordnance stations (new) \$250,000; training station, Newport, \$110,000; training station, San Francisco, \$75,000; training station, Great Lakes, \$35,000; marine barracks, Peking, China, \$25,000; marine barracks, San Diego, Cal., \$1,500,000; fuel depots, \$750,000; operating base, Hampton Roads, \$2,500,000.

Butterfield & Co., Rock Island, Que., have recently completed the erection of a complete plant for the production of small tools and are now in a position to take orders for all kinds and styles of twist drills and milling cutters, in high-speed or carbon steel. They are especially equipped to handle orders for drills, milling hobs, etc., used in the making of shells and other munitions.

The name of McLain's System, Inc., 906 Goldsmith Building, Milwaukee, has not been changed to the McLain-Carter Furnace Co. as announced in THE IRON AGE of Nov. 29. The latter company is a separate organization which will market the oil burning open-hearth furnace formerly sold by McLain's System.

Tin Plating with Coke Oven Gas*

An installation of 22 furnaces utilizing coke oven gas having a heating value of about 525 B.t.u. has been made by the Surface Combustion Co., Long Island City, N. Y., at the Baltimore sheet and tin plate plant of the Bethlehem Steel Co., Sparrows Point, Md. In the process of coating steel or iron with tin the raw material consists of black sheets usually about 20 x 28 in. in size and varying in thickness from No. 26 to No. 33 gage. These are pickled in dilute sulphuric acid to remove the scale and stored under water in portable steel tanks from which they are taken as needed and fed into the tin bath.

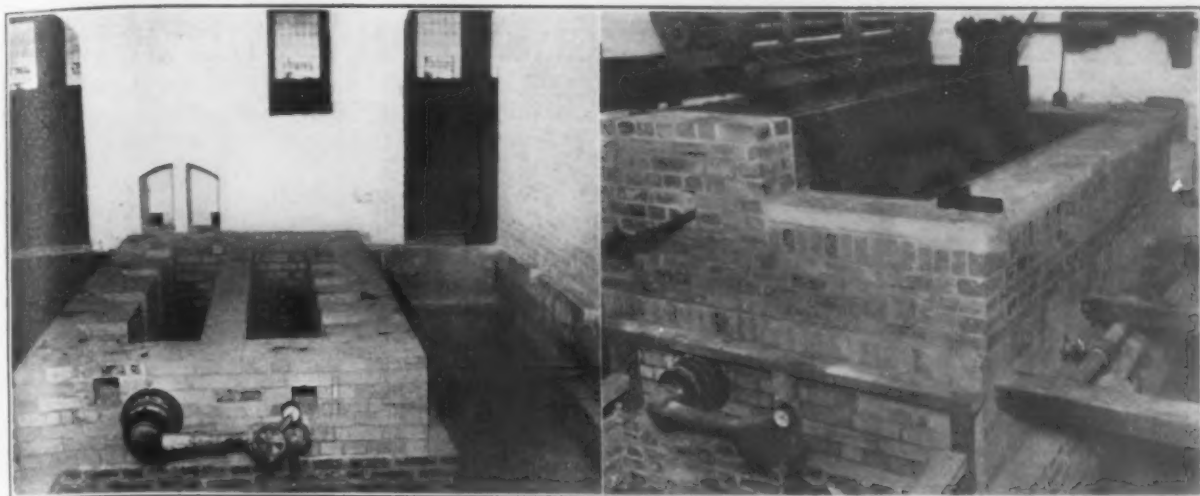
The furnace employed for the purpose consists of a firebrick setting built around a rectangular cast-iron pot or bath of special design. This measures approximately 5 x 9 ft. and when filled to the working depth of 11 in. contains 11,000 lb. of tin. A partition extending the full length of the pot divides it into halves and has a slot near the bottom extending throughout its entire length. One compartment is filled with molten tin covered with a flux of zinc chloride through which the sheets are fed into the bath, while the other compartment, the sides of which are higher, contains palm oil through which the sheets emerge from the bath. A set of gear driven rolls are provided for drawing the sheets through the tin as they are fed in by the operator.

All of the burners employed in the furnaces operate on the high-pressure system with single-valve control and one pipe for distribution. The gas is supplied to the plant at a pressure approximately of 10 lb. per sq. in., which eliminates all blowers and compressors. The burners are of the impact type and heat refractory beds in the combustion chamber. This chamber is located under that portion of the pot where the cold sheets are fed into the bath and the burners supply all the heat needed for normal operation. The arrangement of the burners and the chamber is shown in the right portion of the left

*From information obtained from William J. Harris, Jr., engineering department, Surface Combustion Co., Long Island City, N. Y.



980 Lb. of Steel Sheets Was Coated with Tin in One Hour in a Furnace Employing Coke Oven Gas to Keep the Tin in a Molten Condition



The Left Compartment of the Tinning Pot Contains Palm Oil and in the Adjoining One Tin Covered with a Flux of Zinc Chloride Is Kept in a Molten State; at the Right the Construction Has Progressed Further and the Supply Pipe for the Burner Which Warms up the Pot when Work Is Started for the Week Is Shown

section of the group engraving. The passage of the sheets through the outlet side of the bath is relied upon to supply all the heat required under ordinary conditions. When the pot is being warmed up at the beginning of the week, it is necessary to apply heat to the outlet compartment, and for this purpose a single large burner of the non-refractory bed type is provided at the left end of the combustion chamber. This will be noticed in the right portion of the group illustration underneath the set of rolls which have been removed from the bath.

In a test made of the installation 7850 lb. of steel sheets was coated at a temperature of 650 deg. Fahr. in 8 hr. The amount of gas consumed was 5376 cu. ft. having a heating value of 525 B.t.u. This was at the rate of 980 lb. per hr. with a gas consumption of 672 cu. ft.

Labor Turnover Records

A paper was presented at the meeting last week in New York of the American Society of Mechanical Engineers by Richard B. Gregg, New York, on labor turnover records. From it the following notes have been taken:

By measurement and analysis we can determine, or at least approximate, the cost of losing a worker in a particular position and training another. These costs may be roughly divided into overhead costs and operating costs.

Among the overhead costs there are:

- 1 More rapid depreciation of machinery because of ignorance or lack of skill of new workers.
- 2 Extra floor space and extra machines to provide against idleness of a certain amount of machinery due to shifting labor.

Operating costs may include any or all of the following:

- 1 Time of increased superintendence or office work, including:
 - a Time spent by foremen or superintendent in discharging a worker where that is the way the vacancy occurred.
 - b Time spent by foreman or other workers in training the new employee.
 - c Time spent by clerks on additional payroll or other records.
- 2 Machine costs, covering:
 - a Time machinery is idle when a new worker cannot be obtained immediately.
 - b Idle machinery for temporary stoppages due to ignorance or lack of skill of new worker.
 - c Repairs to machines or renewals of tools broken for the same reason.
- 3 Material costs, including:
 - a Waste or damaged material due to ignorance or lack of skill of new worker.
 - b Difficulties in subsequent processes due to

poor work by new employees in previous processes.

- c Lower production while new employee is working up to his best skill.

- 4 Additional accident cost due to higher rate of accidents among new employees.

These two kinds of overhead costs and four groups of operating costs, while not exhaustive, serve to illustrate the method of observation, recording, measurement and analysis which is just as helpful in this aspect of the matter as elsewhere. With knowledge so obtained the factory manager is in a position to estimate more truly the importance of this problem and to judge whether he can afford to take certain steps to reduce the turnover.

As is probably well known, those who have made the most careful studies of this question find that it costs about \$10 to replace an ordinary laborer, and as much as \$300, and perhaps more, to replace skilled workers. The cost varies of course with the nature of the position. The total losses are, of course, enormous. Magnus Alexander, in his well-known study, estimated the losses in a group of twelve metal working factories in a single year at not less than \$831,000. The annual loss from high labor turnover in a particular textile mill employing about 2000 workers is estimated as at least \$20,000. These instances could be multiplied.

It should be remembered, moreover, that none of these estimates include the losses to the employees or the community. What frequent job shifting means to the employee and his family in terms of frequent house moving, ill-feeling, discouragement, bitterness, decrease of skill, lowering of pride and self-respect, we have no means of measuring. What it means to the community and nation in terms of underemployment and unemployment, increased pauperism and drinking, inefficiency, and social friction, we cannot even estimate.

Production of Fluorspar in 1916

The production of fluorspar in the United States in 1916 was larger than in any previous year. The output was 155,735 net tons as compared with 136,941 tons in 1915 and 115,580 tons in 1913, according to Ernest F. Burchard in a U. S. Geological Survey Bulletin 666-CC on "Fluorspar." Prior to 1905 the production was less than 50,000 tons per year. Up to 1908 it fluctuated, but in 1909 it began to increase, owing to the more general recognition of its value in making open-hearth steel. The 1916 imports were only 12,223 tons as compared with 22,682 tons in 1913. American fluorspar deposits have proved ample to supply more than the mineral needed to make up for the decrease in imports.

Two hundred employees of the American Car & Foundry Co., at Terre Haute, Ind., are on strike for a 40 per cent increase in wages.

Fixing of Prices for Naval Contracts

Secretary Daniels Discusses Important Topics—Policy as to Plant Additions—Demand for More Yards—Labor Questions

WASHINGTON, Dec. 11.—The fixing of prices for naval contracts and the determination of fair methods of cost accounting constitute features of the forthcoming annual report of the Secretary of the Navy that will be examined with interest by all manufacturers. The problem of modifying cost-plus-profit agreements so as to protect the Government without imposing hardship on the contractor has received special attention at the hands of the department and a plan has been worked out that has operated very satisfactorily as to a number of important transactions. In the purchase of material, however, the department at times has invoked the somewhat arbitrary method of fixing the prices it will pay, demanding the delivery of the material and giving the seller the option of accepting payment in full at the department's figure or 75 per cent thereof with the privilege of bringing suit in the Court of Claims for the remainder.

More than a year ago, the Secretary says, it became evident that it would be very difficult to place reasonable contracts at stipulated prices for a number of battle cruisers authorized by Congress because of the size of the contracts, the time over which they would extend (three years or more) and the uncertainty of labor and material costs. Congress had authorized the Secretary of the Navy to contract for these vessels on the basis of "actual cost plus a reasonable profit to be determined by him." As none of the important shipyards would undertake the work at an upset price or within the limit of the appropriation, Congress granted additional money and thereafter contracts for these vessels were let on a cost-plus-profit basis.

The Department's Definition

For the purpose of determining actual cost, as to which hardly any two accountants would agree exactly, the department adopted a definition embracing the following items:

- (a) The cost of raw materials entering into the manufacture;
- (b) Running expenses, including rentals, cost of repairs and maintenance, heat, power, insurance, management, salaries and wages;
- (c) Interest paid within the taxable year on debts or loans contracted to meet the needs of the business, and the proceeds of which have been actually used to meet such needs;
- (d) Taxes of all kinds paid during the taxable year with respect to the business or property relating to the manufacture;
- (e) Losses actually sustained within the taxable year in connection with the business of manufacturing such articles, including losses from fire, flood, storm or other casualty, and not compensated for by insurance or otherwise; and
- (f) A reasonable allowance according to the conditions peculiar to each concern, for amortization of the values of buildings and machinery, account being taken of the exceptional depreciation of special plants.

To insure the correct ascertainment of cost and to guard against extravagance the department organized a compensation board composed of distinguished officers of the navy whose function it was to pass finally upon all expenditures under these cost-plus contracts. Cost inspection officers were ordered to all of the private yards engaged in naval construction the operations of which have been followed with minute attention. No large expenditures for material can be made until the price has been approved by the compensation board and the inspection system of the department is such that it is believed that no large extravagance or misdirection in labor can escape detection and correction.

Plant Additions

The compensation board has another very important function. It was necessary, under the conditions, for

many contractors to increase their plants in order to undertake the work required, with the expedition necessary. They claimed—and with much justice—that these extensions were not warranted by their business, would cost much more under present conditions than in a normal market, and might be valueless to them when the emergency has passed. It was impossible to make stipulated-sum contracts in connection with these necessary extensions which would be fair to all concerned, in view of the uncertainties existing. The department's policy has been in such matters to provide the necessary facilities, either of a temporary or permanent nature. Special temporary facilities, movable tools, etc., have been usually provided at the cost of the Government, the tools to remain the property of the Government, and the salvage value of the temporary facilities also to belong to the Government. Permanent improvements and extensions of plant have been financed up to various percentages by the Government, but upon termination of the contract, settlement is to be made upon the basis of the then value to the contractor of such improvements in his plant, the result being that in the end the Government would pay the extra cost necessitated by providing these improvements now, and the contractor would pay the actual value to him of the improvements when the contract has been terminated and the work done.

Naturally the question of this value may be expected to be a somewhat controversial one. The department has insisted, in all improvements having to do with building ships—except in a few special cases—that this final value shall be ascertained and determined by the compensation board, composed wholly of naval officers. It is believed that all contractors will be treated fairly by the board of distinguished officers who will pass upon such matters, and the department much prefers that its own officers should have this determination, as it will undoubtedly avoid much complication.

Contracts Modified

Since March 1, 1917, a number of contracts previously made at stipulated sums have been modified to the cost-plus-profit basis. This has been done for one of two reasons: either it was necessary to accelerate the progress upon construction or to delay certain vessels to enable other vessels to be speeded up. In either case, the action necessary made such a radical change in conditions under which work was to be carried out that it seemed advisable to change the basis of the contract. As a general rule, the percentage of profit has been fixed at 10. In some of the latest vessel contracts, however, a somewhat different plan has been adopted, a fixed sum being allowed for profit, which is slightly under 10 per cent on the present estimated cost of the vessels; should the final cost fall below the estimated cost, the contractor and the Government divide the saving. Expenditures under these contracts also are strictly under the control of the compensation board.

While the contracts for new vessels have probably involved more difficult problems than any others, there have been more or less difficulties with other contracts, such as for provisions and supplies for the fleet, and material of all kinds for the work carried on in navy yards. In many cases, the proposals received for supplies have appeared unreasonable, even considering the conditions of the market. Contracts for such materials and supplies do not usually involve long periods in production between the time of placing the order and the delivery of supplies, so that there is a better opportunity for contractors to ascertain costs and bid at fixed prices. Moreover, conditions at the works producing such materials and supplies were not such that the department could ascertain for itself the exact cost, as

it does in shipyards, without prohibitive expense and delay.

Awards at Stipulated Prices

The policy of the department has been in all such cases to adhere as far as possible to awards at stipulated prices. When bids appear too high, investigations have been carried on to determine reasonable costs to contractors and reasonable prices under the conditions. Prices have been fixed accordingly and orders placed under the authority vested in the President by the naval appropriation act approved March 4, 1917, and the urgent deficiency act approved June 15, 1917.

In this way supplies have been secured at prices deemed generally satisfactory under present conditions and it is hoped that the complications and uncertainties involved in cost-plus-profit contracts can be avoided. Such contracts are not to be made except in emergencies, and even then only when contracts at a fixed price are impracticable. The department has sought in every possible way to safeguard the contracts on this basis, which necessity impelled.

Navy Yard Policy

Referring to the work of the special board appointed with Rear Admiral Helm as chairman to investigate and report as to the desirability of expanding existing navy yards, to enable all of them to build warships. The Secretary says:

"The study of this commission, composed of able officers, is convincing proof of the wisdom of utilizing all the navy yards and stations which have been constructed in former years, and of the necessity of providing still others if our Navy is to expand. A careful reading of the report will be a complete answer to the propaganda waged for years for abandoning all the navy yards hitherto established except two on the Atlantic, and to establish an entirely new one on the Pacific, abandoning those already in use. Every navy yard that can not be profitably used and is not needed should be abandoned, but this war has taught us that we cannot depend, for so wide a coast line as the Atlantic for example, upon two yards."

During the past year, the Navy has greatly increased its force of skilled labor and the drafts that have been made upon the labor market of the country on this account may be gathered from the fact that the number of civilian employees under the direct pay of the Government has increased in the various navy yards from 35,650 to 60,866. The department has had the co-operation of the Civil Service Commission, the Department of Labor, and the American Federation of Labor and various international unions in the procurement of skilled workmen.

After extended conferences with representatives of the men employed and with the assistance of organized labor, a new scale of wages was put into effect on Nov. 1, and it has been agreed that this scale shall continue in force for one year. Increased compensation was provided in every navy yard to practically every trade employed.

Concerning the department's project for naval construction for the coming year, the Secretary calls attention to the three-year program adopted pursuant to the act of Aug. 29, 1916, embracing 167 vessels to be begun prior to July, 1919, and recommends that Congress at the present session authorize the completion of that program, which will include three battleships, one battle cruiser, three scout cruisers, nine fleet submarines, two fuel ships, one transport, one destroyer tender, one ammunition ship and one gunboat.

W. L. C.

The reorganization of the Stegeman Motor Car Co., Milwaukee, truck manufacturer, involves the following changes in the official personnel: Adam J. Mayer has been elected president to succeed Oscar Stegeman, who resigned. Lynn S. Pease has been elected secretary-treasurer to succeed L. G. Schertl, resigned. E. M. McLean, formerly advertising manager Four Wheel Drive Auto Co., Clintonville, Wis., has been appointed sales manager. The company will continue to build six-cylinder, worm-driven trucks exclusively.

THE SMALL TURBINE SITUATION

Standardization to Reduce Costs—Performance Guarantees Not Important

SPECIFICATIONS customarily applied to small non-condensing turbines used for driving auxiliary machinery were deprecated by W. J. A. London, steam turbine department, General Electric Co., West Lynn, Mass., in a paper presented before the American Society of Mechanical Engineers at its annual meeting in New York last week, as being unnecessarily severe and entailing production costs which necessitate higher selling prices than would obtain if less rigid, but in his opinion equally satisfactory performance requirements were demanded. A commercial analysis of the Terry, Westinghouse, Curtis and Kerr types of small turbines leads him to believe that standardization of specifications, including consumption, regulation and overload guarantees, will eliminate many of the misunderstandings which now arise between manufacturer and customer, reduce the selling price and increase the popularity of the turbine driven unit. A review of his paper follows:

Steam Consumption and Speed Regulation

For small non-condensing turbines driving auxiliary machines, high thermal efficiency is in many cases unnecessary because of utilization of exhaust steam. Also the class of labor employed to look after auxiliaries, together with the adverse conditions under which these usually operate, make simplicity and durability more important than efficiency. The turbine manufacturer to-day builds one line of machine. Any machine sold subject to a witness-test is necessarily one of a lot of these machines. If this meets its guarantee of steam consumption it is only fair to assume that the others cannot be far off the mark. The witness test clause in specifications is, therefore, frequently unnecessary and its elimination would reduce the cost.

A speed-regulation guarantee is necessarily important in such work as generator drive, but is of no importance when the speed of the turbine is primarily governed by a pressure regulator as in the case of a boiler-feed pump or forced-draft set controlled in a similar manner. Yet the manufacturer usually puts in his 2 per cent clause. Even with the generator drive the average clauses are too exacting for the good of the customer. The compensated-wound generator can give flat compounding with a large speed variation and a reasonably large speed variation means stable governing, whereas a sensitive governor means instability and a tendency to hunt. To obtain close variation on test means delicate fitting and adjustment of the governor valve. The valve must shut absolutely tight, and any valve built this way is subject to cutting in service; whereas, if a wider speed variation were permissible a more durable valve could be installed.

Load Ratings and Limitations

There is a tendency to introduce the maximum-rated standard of load requirements into small turbine specifications and it is the only proper competitive basis. Experience shows that it is not feasible to order a turbine without an overload margin to take care of reasonably expected errors in estimating the capacity of a pump. The turbine builder knows this and frequently finds that the addition of another jet above that necessary to meet the contract is a good investment. This does not lead to fair competition among turbine makers. The worst feature is that in some cases in a cut-price job the pump maker relies on the overload capacity of the turbine to give him full load at the pump. The adoption of the maximum-rated standard by all turbine makers and rigid adherence to it would in a great measure solve this problem.

The limitations of the turbine must be impressed on the customer. As long as he thinks it can be loaded up to the breaking-down point, like a motor, there will be dissatisfaction if the machine fails to carry full load when the steam pressure drops. With a condensing machine, considerable variations in initial steam pressure can

take place without materially affecting the output, but in a non-condensing machine a multiplicity of small deviations from the contract conditions, each insignificant in itself, can have a very marked effect on the output, as indicated in the table:

	Steam Press, Lb.	Quality, Per Cent	Back Press, Lb.	Hp.
Specified conditions	150	100	0	100
Operating conditions	140	98	2	83

Responsibility for Operating Performance

There is a deplorable lack of co-operation between the average turbine builder and many of the pump and blower builders. If a unit after erection is reported unsatisfactory and the report goes to the pump builder, he almost invariably assumes the trouble is in the turbine and calls upon the turbine maker to send a man to remedy it before he makes an investigation as to the performance of his own apparatus, and vice versa if the original report goes to the turbine maker. This state of affairs encourages the purchaser to buy from firms manufacturing composite units.

One of the hardest propositions confronting the manufacturer is the collection of expenses when the trouble has been entirely due to the operating engineer's neglect. If this engineer knows at the outset that investigational expense of trouble caused by his own negligence is to be charged against him, he will make sure of his ground before he risks the displeasure of his superiors by showing his incompetence to adjust the machine or by running up unnecessary bills in his department.

Alignment Problems

As a factor in the performance of the composite unit alignment of the turbine with the driven machine is important. Where the unit is built in one shop the designer has a distinct advantage, inasmuch as he can design both ends to make one rigid unit. The average so-called flexible coupling will not satisfactorily take care of misalignment. The bedplate cannot be commercially designed so it will stay true from test floor to foundations, and, no matter what care has been taken in the shops, realignment after erection is necessary. Various methods have been advanced to eliminate this, such as the three-point support and the three-bearing unit with the elimination of the flexible coupling. The latter is practicable where one firm builds the whole unit, but otherwise, up to the present, it has not worked out satisfactorily. To overcome this trouble, the Steam Motors Co. has recently developed a turbine supplied with only one bearing and a solid coupling for connecting to the driven apparatus. By taking a standard pump or blower and removing one bearing and fitting a solid coupling to the shaft, the combination of steam motor and pump becomes a two-bearing unit, with a shorter bedplate and the elimination of misalignment troubles.

Discussion

O. D. H. Bentley, manager, engineering turbine department, B. F. Sturtevant Co., Hyde Park, Mass., agreed with Mr. London that a flexible coupling cannot take care of misalignment and that the bedplate will not stay true from test floor to foundations. Realignment after erection is necessary, but when this is properly done it will be maintained indefinitely, provided a suitable foundation is used. Engineers, he said, seem to agree that a turbine rotor mounted between two bearings is preferable to the overhung type. The overhung type is cheaper and will occupy less space, but is more likely to give trouble.

A. G. Christie, associate professor, mechanical engineering, Johns Hopkins University, expressed his opinion that the days of cheap coal are past, that in the future economizers will be more extensively used, and that this will make desirable high efficiencies from auxiliaries. Turbines, he believes, can be improved to give better economies without increasing manufacturing costs. He agrees with Mr. London's statement that engineers are frequently unreasonable in their guarantee specifications, but believes this due to the reluctance with which manufacturers give out data pertaining to operating performances under various conditions.

C. P. Crissey, New York, stated that one guarantee point is sufficient. He believes that good results can be obtained from a two-bearing unit having a small overhung turbine wheel, but that these should be manufactured by makers of combined units. He advises customers to guard against two or three-bearing units that have not been operated with the same distances between bearings, the same diameter of shaft and the same loads on the shaft. He believes that a code should prohibit bearing temperatures of 250 deg. Fahr.

Dimensions of Open-Hearth Furnaces

V. Grum-Grzhimailo, a prominent Russian metallurgist, has published in a recent issue of the *Journal of the Russian Metallurgical Society* a table of the increased dimensions he suggests for open-hearth furnaces used for making steel by the ore process as compared with those used in the scrap process. Basing his calculations on data furnished by Mr. Pavlov in a previous issue of the same journal, he arrives at the dimensions shown in Table 1 (converted into English equivalents) for furnaces used in the scrap process. The type of hearth adopted for his calculations is rect-

Table 1—Scrap Process

Capacity of Furnace, Tons	Dimen- sions of Bath, Ft.	Surface Area of Bath Sq. Ft.	Height of Roof from Bath, Ft.	Cubic Contents of Combustion Space, Cu. Ft.
15	21.32 × 8.52	181.70	5.25	954
20	23.45 × 9.18	215.29	5.91	1,271
25	26.25 × 9.84	258.35	6.15	1,589
30	27.89 × 10.50	290.64	6.56	1,907
40	31.00 × 11.48	355.22	6.56	2,543
50	34.45 × 12.46	430.57	7.15	3,178
60	36.74 × 13.12	484.39	7.87	3,814

Table 2—Ore Process

Capacity of Furnace, Tons	Dimen- sions of Bath, Ft.	Surface Area of Bath Sq. Ft.	Height of Roof from Bath, Ft.	Cubic Contents of Combustion Space, Cu. Ft.
15	22.37 × 9.57	215.29	4.43	954
20	24.61 × 10.33	254.04	5.00	1,271
25	27.47 × 11.07	304.63	5.21	1,589
30	29.20 × 11.81	344.46	5.53	1,907
40	32.41 × 12.89	417.66	6.09	2,543
50	35.96 × 13.98	502.69	6.32	3,178
60	38.39 × 14.76	566.20	6.73	3,814

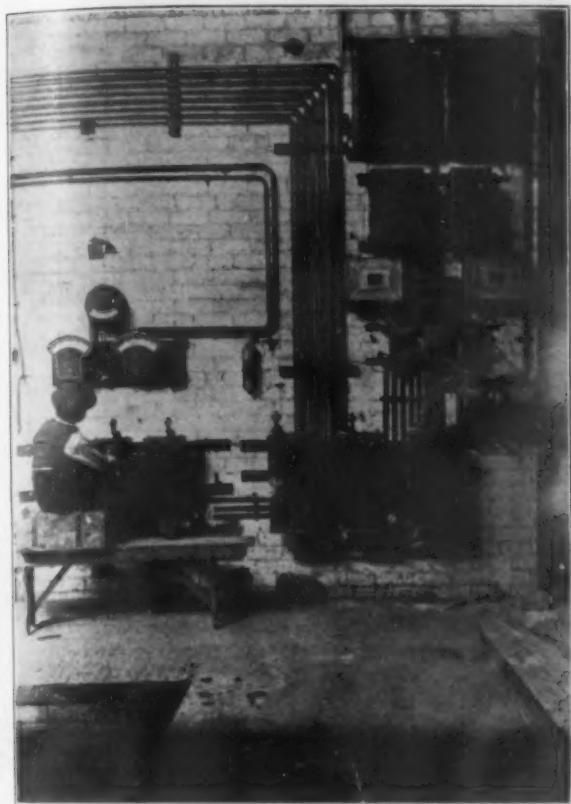
angular in shape, with a bottom width of 1.2 m. (about 4 ft.), and with slopes forming an angle of 26½ deg. with the horizontal. The initial depth of the bath is assumed to be 40 cm. (about 15¼ in.). While in the scrap process the bath only increases about 1½ times in volume, in the ore process, owing to the more vehement ebullition, the bath increases as much as from 2 to 2½ times in volume. Consequently, to save undue wear of the sides and roof of the furnace, provision has to be made for an increase of about 17 to 18 per cent in the surface of the bath, as shown in Table 2. The author gives cross sections for two 30-ton furnaces. Up to a level of ½ m. (about 1 ft. 8 in.) the two sections are alike, but in the case of the hearth for the ore process provision is made for an extra depth of 0.2 m. (about 8 in.) for the bath, and the angle of the slopes in this portion is made 45 deg., giving a top width of 3.6 m. (about 11 ft. 10 in.), as against 3.2 m. (10 ft. 6 in.) in the hearth for the scrap process. The increase in width of the surface of the bath works out at from 17 to 18½ per cent.

The Toronto plants of the Canadian Fairbanks-Morse, Ltd., are preparing to turn out a new order recently received by the company from the American Government for 1,500,000, 75 mm. shells, which have been ordered from a number of Canadian concerns within the past month. The plant is now being prepared to turn out the new order as expeditiously as possible. The company is also engaged upon filling an order for 300,000, 6-in. shells for the Canadian Government. These two orders will keep the plants of the company engaged until next fall.

The Ingersoll-Rand Co. has commenced the employment of female labor at its works at Phillipsburg, N. J. About 30 women are now employed to operate drill presses and shapers.

Electric Steel Furnace Operated by a Boy

The photograph reproduced below comes to THE IRON AGE as an illustration of the human interest side of steel making. It was taken recently during



The Hand Operation by Boys and Girls in England of Greaves-Etchells Electric Steel Furnaces

the production of a 2-ton nickel-chrome-vanadium steel heat in a 2-ton Greave-Etchells electric furnace at the plant of Thomas Andrews & Co., Ltd., Sheffield, England. From the standpoint of electrical equipment the illustration is of little interest. The furnace, however, is entirely hand-operated by means of a tramway type of control worked in conjunction with recording ammeters, and the point of special interest is the furnace operator, particularly his size. A boy runs the furnace regularly. Other furnaces of this type in England are being operated similarly, but at present mostly by girls owing to the shortage of male labor. Such results, it is suggested, would have been ridiculed only a few years ago. The three controllers on the right represent the electric crane control for the ladle, etc.

To ascertain the value of army motor trucks as a means for rushing out details of men for patrol or skirmish duty at points too remote to be quickly reached by cavalry, or when the call is too urgent to await the assembly of railroad cars, a test was recently made on the Dixie highway between the cantonments at Atlanta and Chattanooga. The truck beat the time of the fastest train between the two points. A White truck with a body designed by Lieut.-Col. Hugh J. Gallagher, depot quartermaster at Atlanta, was used. The troops sit back to back lengthwise of the body and their rifles, when not immediately needed, may be stored in rifle chests built between the backs of the seats. The foot rails and arm rests protect them from being swayed or thrown off when rounding corners at high speed or moving rapidly over rough roads. The footrail is hinged and lowered to serve as a step when mounting. Each man's personal equipment is carried in lockers under the seats. Special lockers are provided for 500 rounds of ammunition for each man. In the rear is a compartment holding three days supply of the non-perishable components of rations.

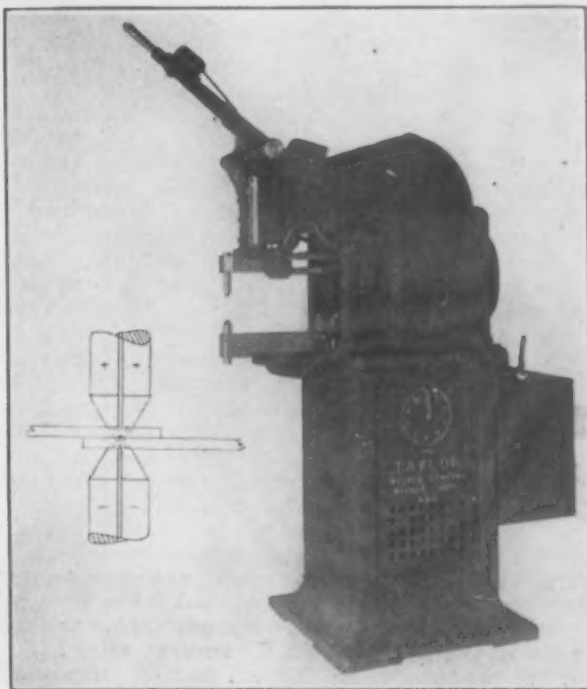
New Machine for Heavy Spot Welding

Under a patent granted to A. C. Taylor, the Taylor Welder Co., Warren, Ohio, is manufacturing a new electric welding machine. The operating principle differs somewhat from the machines now on the market in the employment of split rather than solid electrodes. This arrangement enables heavier work to be handled as well as permitting the machine to operate on polyphase current without unbalancing the line.

The lower horn and the upper point holder, together with the welding electrodes themselves, are split and insulating material is interposed between each piece. This, it is pointed out, permits the electrodes to be separated and steel pressure dies placed between them. It is thus possible to pass two or more separate currents of high amperage in a bias direction through the metal and when a welding temperature has been attained additional pressure may be applied with the dies to complete the weld. The copper electrodes are not subjected to any more pressure than is required to make a good electrical contact, being used only to carry the current and not to sustain the heavy pressure required to force the material together and complete the weld. In this way it is possible to spot weld material, particularly that which exceeds $\frac{1}{4}$ in. in thickness.

In addition to separating the electrodes the leads from the secondary of the welding transformer are also split and are crossed where the connection is made to the lower horn. This, it is explained, causes the current to be crossed as illustrated by the dotted lines in the sketch at the left of the machine.

The ability to use the machine on polyphase circuits without unbalancing the line, it is emphasized, is an advantageous feature since spot welding machines generally require single-phase current for their operation. It is further explained that when machines of this kind are



The Use of Split Electrodes in a New Spot Welding Machine Enables Material $\frac{1}{4}$ In. and Heavier to be Handled

operated on polyphase circuits there is a tendency to unbalance the line which is objectionable if the lines are heavily loaded or the generator employed is of small capacity.

Plans for the new plant which the Niles-Bement-Pond Co. will build at Kearny, N. J., are being prepared by Harris & Richards, architects, Drexel Building, Philadelphia. Preliminary estimates fix the cost of the buildings and equipment at \$2,000,000 to \$3,000,000. There will be several buildings, which are to be used for the manufacture of machinery and machine tools.

Mechanical Engineers Discuss War Work

Effect on Profession, Employment of Women, Conservation of Fuel and Inspection of Munitions Are Topics of Annual Meeting

ENGINEERS can no longer restrict themselves to their technical profession but must prepare to assume new and greater industrial and social obligations. This was the keynote of the thirty-eighth annual meeting of the American Society of Mechanical Engineers held in New York last week, expressed by Dr. Ira N. Hollis, the outgoing president, in an address before a section of the society devoted exclusively to the discussion of topics relating to the public duties of engineers in times of crises. Public service, he emphasized, is the first duty of the engineer; a duty which under present conditions is particularly urgent, and which, continuously expanding, is likely to embrace, as a permanent part of engineering, Government work requiring a knowledge of the humanities as well as technical training. The engineer, he said, must study history, the science of government and the problems of labor that he may grow to the maximum of his possibilities. Professor Dexter S. Kimball of Cornell University, speaking on the relation of industrial management to engineering brought out a co-ordinate thought. He said that engineering is broadening to include fields formerly not considered related to the profession and its ramifications are now so extensive that redefining the aims of the society would be appropriate. Industrial management, he emphasized, is a legitimate part of engineering work.

Engineers in Government Work

Regarding the needs of the Government for the co-operation of engineers and their influence on its activities, Dr. Hollis pointed out that a large part of the business of the country relates to industries, transportation and engineering enterprises, and yet, he said, there is hardly a man in Congress who has a grasp of engineering matters. As an instance of what can be accomplished by putting a trained man at the head of a department, he cited the case of Mr. Hoover. Mr. Scott at the head of the War Industries Board and Mr. Coffin at the head of the industrial survey, were other examples to which he referred of what the engineering profession may contribute to the success of the Government. Dr. Hollis further pointed out that forces antagonistic to freedom are likely to develop. The war, he said, will create many millionaires and will strengthen trade unions into autocratic groups with powers to define what each individual shall be permitted to do and what wage he shall receive. He urged that the engineers co-operate to counteract any such tendency.

Gano Dunn, chairman of the Engineering Committee of the Council of National Defense, pointed out, as an indication of the willingness of engineers to give their services to the Government, that there is not yet on record a single case of an engineer failing to serve promptly and faithfully the Government after having been requested to do so. He said that engineers stand ready to respond by severing their business connections and sacrificing their incomes.

Technical Education as Affected by War

Interest was manifested in technical education as affected by the Government's enforcement of draft regulations, discussed by Dr. Charles S. Howe, president of Case School of Applied Science. He emphasized that if present methods are carried out there will be no teaching of engineering in colleges in a few months and that this phase of the question is of vital importance both from the Government's and industry's point of view. Colleges, he said, have lost from 20 to 30 per cent of their students, and cannot supply one-quarter of the engineers needed to-day. He urged that something be done before Dec. 15 as the ruling of the Government that after this date students may not

voluntarily enlist has created a feeling of uneasiness which is tending rapidly to deplete the colleges of men. Students, he pointed out, naturally fall in Class A, and, he believes, are all likely to be taken in the next draft. If all men over 21 years of age are to be taken from the colleges, he urged that adequate consideration be given to the possibilities of training sophomores and freshmen for particular services by changed methods and curricula.

The Coal Problem

One session of the convention was devoted to the study of power plant problems. In this session the preventable waste of coal in the United States was discussed by David Moffat Myers, consulting engineer, Griggs & Myers, New York, and a commercial analysis of the small turbine situation was presented by W. J. A. London, steam turbine department, General Electric Co., West Lynn, Mass. The latter paper is reviewed elsewhere. Mr. Myers pointed out that the large plants which are consuming fuel wastefully, in many cases, he believes, more wastefully and carelessly than ever before, are needlessly causing a large part of the existing car shortage and are counteracting other measures of efficiency in production and distribution. By employing proper operating methods in boiler plants he believes it easily possible to save over 10 per cent of the coal used in this work which, he said, would mean a saving of 50,000,000 tons a year. This, he estimates, would release cars for other important service equivalent to the entire coal carrying capacity of the Pennsylvania lines east of Pittsburgh and with coal at \$5 a ton would mean a direct money saving to the industries of a quarter of a billion dollars.

W. N. Polakov, consulting engineer, New York, discussing this question, suggested that of two methods proposed for lessening the waste of fuel, namely, Government coercion and education, the use of coercion is the more feasible. He believes that the Government should give priority in coal deliveries to those indispensable industries consuming fuel efficiently, thereby increasing their output and stimulating the less efficient consumer of fuel to improve his plant and establish better economy. This he pointed out may involve the rating of plants of indispensable industries by experts on fuel consumption. He believes that organization of a properly trained boiler-room force will in many cases bring about an effective saving in fuel without further capital investment.

Albert A. Cary, consulting mechanical engineer, New York, emphasized that the problems involved in establishing efficient consumption of fuel center around the proper design of the furnace for the coal being used. The choice of refractories, he said, is also important, and this, he pointed out, should not be left to the mason contractor. He believes that permanent results can only be obtained by reaching the man who shovels in the coal. These men, he said, are usually antagonistic to endeavors to change their methods of working, and he believes that the proper method of solving this problem is to license firemen. Government inspectors could then make recommendations to plants wasting fuel, and, if these recommendations are not followed, the licenses of the firemen may be removed. This, he believes, will weed out inefficient firemen, stimulate better firing and will improve both the plant operation and the condition of the men. He referred to two plants in which substantial improvements in boiler economy were made. In one plant of 7000 boiler-hp. capacity, changing from hand-fired to machine-stoked equipment enabled the plant to operate at 50 per cent over its normal rating, yet consuming no more coal than it formerly did at two-thirds that load. The Tennessee

Copper Co. redesigned its furnaces, adapting them to the coal used and substituting automatic stokers for hand-fired grates, and succeeded in obtaining with 64 per cent of the fuel formerly used an equal output.

L. P. Breckenridge, professor mechanical engineering, Yale University, urged that coal must not only be saved but must be saved immediately. Sixty-seven per cent of all coal produced, he said, goes for steam making, and this field offers the best opportunity for immediate results. Industries should work in conjunction with fuel administrators of states and each administrator should know how the particular coal consumed in his district is properly burned. He referred to the work being done by the states of Illinois and Connecticut. In New Haven, he said, the Chamber of Commerce undertook the teaching of firemen by presenting to meetings of firemen lectures on proper methods of firing coal. Much interest was manifested by the men, and he suggested that the engineers of the country co-operate by organizing committees to carry on similar work in other states. The Connecticut plan provides for expert firemen to visit plants and demonstrate to the men proper firing methods.

Shop Costs on Idle Machines

H. L. Gantt, industrial engineer, New York, discussing manufacturing costs, stated that the expense of maintaining a machine while idle cannot legitimately be charged to work done on it, and should be put in a separate account. Those people who include in their costs expenses which do not contribute to production are simply trying to recover from the public, through a higher selling price, expenses resulting from inefficiency. The segregation of overhead expenses attached to idle machines from those of productive machines, appears to him to be the only way of avoiding an intolerable situation, which he believes will otherwise arise from the Government's method of giving contracts on a "cost-plus" basis.

In opening the discussion on this paper, Frederick A. Alden, consulting engineer, Cambridge, Mass., indorsed the statements made in the paper and stated that idleness of machinery was due to the use of single-operation machines as distinguished from those upon which a number of operations might be performed by slight readjustments of tools, feeds, speeds, etc. Machinery which to a certain extent had outlived its usefulness was also a cause of idleness on the part of machines, and he recommended that all obsolete stock and machinery be either junked or sold.

Frank B. Gilbreth, industrial management engineer, New York, warmly commended the paper and described the board which he had devised for indicating the status of various orders that had been received and the condition of the different machines in the shop.

Henry Hess, Philadelphia, took exception to the statement made in the paper that costs must be considered by engineers alone, and said that both engineers and financiers should consider the question of costs jointly. The cost of idle machinery would in any event be passed on to the ultimate consumer, in his opinion.

Adolph L. De Leeuw, mechanical engineer, Singer Mfg. Co., Elizabethport, N. J., considered that work along the line of Mr. Gantt's paper was highly desirable, but pointed out that the problem of costs was a great one due to the fact that there were so many variables which entered into it.

Arthur L. Williston, principal Wentworth Institute, Boston, said that confusion in accounting was caused by the fact that costs were not constant, although they were so considered.

Inspection in the Machine Shop

The machine-shop session on Thursday afternoon, Dec. 6, had a distinctly martial flavor imparted to it by the presence of a number of army officers, some of whom participated in the discussions. There were three so-called introductory discussions.

The first, on "The Logic of Inspection," was given by Adolph L. De Leeuw, who stipulated that manufacturing methods depend on division of labor, measur-

ing devices and inspection. Products of all kinds, as a rule, are interchangeable as regards function or design, and machine tools may be interchangeable as to uses but not necessarily as to their component parts. Full interchangeability was, however, made possible by inspection work. The development of machine-tool building from the time when a single man was both a designer and builder was traced through a system of manufacturing in shops by contracts and progressive inspection of the previous operator's work to the present system of inspection where this is done as a part of the shop routine.

While it is unquestionably true that inspectors sometimes lack intelligence, it is his opinion that as a rule this condition exists because the salary paid is not sufficient to attract a man with brains. Specifications are the great problem in inspection, and the aim of the manufacturer is to get a perfect product as the result of a series of processes that are not perfect. The inspector should not be looked upon as a trouble maker, but rather as a useful member of society, although the problem of inspection is still in the dark due to the lack of standards to guide the inspector.

Mr. De Leeuw stated that the allowances made for variation were not so large as might be convenient in a number of cases, and recommended that dimensions be inspected in the drawing room before the work goes to the shop. The causes of failure of inspection are the fact that it is a repetition operation, there are no standards to guide the inspectors and there is as a rule no checking of the inspection. He considered it very desirable that workmen with high ideals should be trained as inspectors with one of the inspection force an engineer, who is broadminded enough to decide whether the product might be used or not rather than whether it conformed strictly to the specifications. He advocated the placing of limits on the gages used as well as on the pieces gaged with master gages to check the gages themselves, and that a combination of accepted and rejected pieces should be reinspected from time to time.

The second of the discussions dealt with "The Relation of Inspection to Products," and was given by F. A. Waldron, industrial engineer, New York. He stated that after having been on both sides of the inspection proposition it was his opinion that the chief trouble lay first with the designer and then with the manufacturer. Rigid inspection is a good thing in the long run, he asserted, although sometimes rather hard at first, from a financial point of view, on the manufacturer. The inspector is continually coming in contact with manufacturers who have no idea of accurate dimensions. He considered it necessary that reasonable tolerances be made with reference to the final functioning of the article manufactured since close tolerances increase the cost of tools, jigs, fixtures, gages, etc. The production of gages in the United States is now as big an industry as the productiveness of the country before the war. In concluding his discussion, Mr. Waldron stated that the inspection department should be brought in closer touch with the designing end of the plant.

The third of the discussions dealing with "The General Principles of Government Inspection and the Relations Between Inspectors and Manufacturers," was presented by Major Erdman, ordnance department U. S. Army. He outlined the method of placing, handling and inspecting Government orders, and said that the most important difference between Government and civil contracts is the fact that the manufacturer cannot sue the Government, and must satisfy the inspector besides being prepared to substantiate thoroughly any charges that he might make against the inspector. The Government inspector was not interested in the completion of the contract so much as in seeing that the quality of the product was maintained. Government inspection is a check on a 100 per cent inspection by the manufacturer, and is carried out only as far as necessary to insure compliance with the specifications.

A Complaint Board of Engineers

Sir Charles Ross, president Ross Rifle Co., Quebec, Canada, suggested as a solution of the inspection problem that an independent body should be formed of rep-

representatives of the engineering societies of the country to hear complaints of the manufacturers and give advice to both the manufacturers and the inspectors and report to the secretaries of war and navy. This plan, he believed, would secure co-operation and approval of the Government, and, at the same time, would settle the differences which arose from time to time between the manufacturer on one hand and the inspector on the other. He considered that such differences of opinion were a good thing, but regretted that at the present time there was no means available for the inspection department to have matters explained by an impartial third party. Later on in the session a resolution referring the question of the formation of such a body to the Council for attention was passed.

Questionnaire on Inspection and Interchangeability

A questionnaire giving suggestive subjects for discussions was sent out to a number of interested members and non-members before the meeting and served as the basis for the general discussion which followed. The subjects covered were inspection and interchangeability and the questions, five in number under each head, are given below:

Inspection

1. How closely can quality be held to the set standard in inspection of munitions?
2. Is it a practical quantity-production proposition to meet the tolerances prescribed by the Government on munitions drawings? If not, what is necessary?
3. How is your inspection department organized? Do you use the following inspections? And if so, in what way: first piece, operation, selective, final? To whom is the inspection department responsible?
4. How is the responsibility for quality divided between the inspection and manufacturing departments?
5. How do you inspect or check the work of inspectors?

Interchangeability

6. How would you define the term interchangeability as applied to a machine or a mechanism?
7. To what extent should interchangeability be attained in munitions manufacture?
8. To what extent should interchangeability be attained in machines used in warfare? (as, for example, aeroplane motors).
9. Considering the conditions under which munitions of warfare are used, should the greater attempt at exact interchangeability be placed upon the units of which the complete mechanism is made or upon parts used in making up the units?
10. Is interchangeability of parts of value in field use, or is it mainly for assembling units?

The general discussion which followed divided the meeting into two groups, one of which believed that the specifications should be rigidly adhered to, while the other insisted that the inspector should be permitted to waive provisions of the specifications which in his judgment were unnecessarily harsh. R. F. Bryant, Yale & Towne Mfg. Co., New York, in opening the discussion stated that the trouble went back to the designing of gages and the fixing of tolerances on individual parts. He believed that care in writing specifications would help production and eliminate trouble in inspection. In the munition contracts which his company had filled the parts were given a preliminary inspection at the machines with a 100 per cent inspection at a central point to serve as a check. This was followed by an inspection by the Government representatives, this last varying from 100 per cent in some cases to a comparatively low figure in others, according to the nature of the part and the average proportion of rejections. This inspection was of the random type. Progressive inspection for single operations prior to assembling was also employed, the work passing along in front of the shop force. This single-operation inspection, he stated, was very rapid, and was supplemented by a final Government inspection after assembly before packing.

Prof. Raymond H. Danforth, Case School of Applied Science, Cleveland, dwelt upon the necessity for material inspection as contrasted with gage inspection. In a number of cases he stated that specification require-

ments could not be met because the physical and chemical requirements did not have sufficient leeway.

Standardization of Inspection

Henry L. Huston, chief engineer A. M. Lockett & Co., New Orleans, La., stated that standardization of the product was expected from inspection and now standardization of this inspection was sought. In his opinion, the proper place to start was with the specifications and not with the inspector, as close limits cause a needless expenditure of energy. Common sense played a large part in inspection, and the inspector should not be hidebound by the specifications, it being better for him to point out why the work was right rather than where it was wrong. Both the elements of material and men had to be dealt with, and the inspection should not be too intensive. What would be permitted in one place would not do in another.

Forrest E. Cardullo, chief draftsman Pierce-Arrow Motor Car Co., Buffalo, stated that specifications could not be drawn to cover all cases, and that the inspector must have authority to waive the provisions of the specifications in some cases, the question of useability of the part being the deciding factor. The purpose of inspection was to keep up the quality of the product to a satisfactory point, and any form of inspection which reduced the volume of production was radically wrong.

H. A. Staples, superintendent raw materials department, Bridgeport Brass Co., stated that there were marked differences in the specifications sent out by the various departments of the Government for the same article and suggested that a standard set of specifications for each article be prepared by the Bureau of Standards.

Closer Limits Than at Beginning of War

Chester B. Hamilton, Jr., manager Hamilton Gear & Machine Co., Toronto, Canada, stated that the Canadian manufacturers are beginning to realize the nicety of barrage fire and the necessity for conforming strictly to the provisions of the specifications. At the present time work that was formerly considered "good enough" would not do. The shop inspection in his plant was the same as that given the work by the government and the earlier operations were held to closer limits than the Government requirements and the tolerances increased progressively, this care in first operations bringing back results in secondary operations as the rejections were materially reduced. He censured the steel makers for carelessness in the matter of the kind of material shipped, and stated that the specification writer knew what was wanted better than the manufacturer. The limits were closer now than at the beginning of the war and would be even more so next year.

Major Erdman said that the contractor was expected to live up to the specifications, co-operate with the Government and call attention to any changes that might be desirable.

C. E. Coolidge thought that something might be said on both sides of the question. The first consideration was the protection of the men at the front, then the Government, and last the manufacturer. This could be accomplished by co-operation, especially if the Government and shop-inspection corps were considered as one body and inspectors were placed at each machine and instructed to co-operate with the operators.

Charles E. Davis, Walco Mfg. Co., Providence, R. I., said that co-operation between the manufacturers and the army inspectors was necessary and reduced rejection of the product. It was necessary to establish the vital functioning points of the finished product first. After this the limits could be fixed and when once established should be rigidly adhered to. The manufacturer must, he said, get together with the Government and the designer.

Women in Machine Shops

A discussion on the employment of women in the metal working industries was introduced by John W. Upp, General Electric Co., Schenectady, N. Y. What he offered was in part as follows:

We have been much surprised at woman's strength

and endurance and are now willing and ready to assign her to duties which were until recently assumed to be entirely beyond the scope of her ability. We have found, however, that it is necessary to recognize some fundamental difficulties if women are employed in these unusual occupations. The carrying trays are so constructed that it is impossible for a woman to obtain a load that is greater than 50 lb., except where the size of an individual piece makes such a limit impossible. Stools or chairs are provided where possible and short rest periods are found advantageous in many cases.

Careful attention must be given to the character of the women employed and more thorough investigation must be made of their references than in the case of men, for the employment of one undesirable woman will frequently destroy the usefulness of a large department. All the women working in any section must be acceptable to the other women or resignations with or without explanation will be apt to take place rapidly.

We also found early in our experience that women between the ages of 18 and 31 are more adaptable and learn more quickly than those who are younger or older.

We have not made any attempt to discriminate between unmarried and married women, except that we have investigated every acceptable applicant with minor children to assure ourselves that she had means of having her family taken care of while at work in the factory.

We never add many women to a department at one time, as we have found it impossible for an instructor to give to each of many new employees sufficient attention to obtain satisfactory results, and usually nearly all those who have not been given the undivided attention of the instructor during the early days of their employment, resign, apparently having reached the decision that they could never learn. We attempt to instruct two women at one time on each machine tool, giving them alternate opportunities to operate the machine tool themselves.

Surprising Results on Screw Machine Work

We find it difficult to teach women to operate screw machines, but when they learn their work is as satisfactory as that of men; and on the lighter screw-machine work we are having the remarkable experience of finding their work more productive than that of men. We do find it difficult to teach women how to operate milling machines and we have had many failures, yet we have women operatives on milling machines doing high-grade work as efficiently as it can be done by men. We have found it difficult to teach women to operate lathes, but now have good women lathe operators in our employ. It has never been difficult to teach women to operate light punch presses, and although we have always considered heavy-punch-press work a man's job we now have women operating heavy punch presses in an entirely satisfactory manner. We have always considered the assembly work on some of our more important operations as being essentially the work of the man who had been trained as a mechanic; but we now find that when properly instructed women can do this work in a way that is entirely satisfactory to us.

It has been necessary to more closely supervise and inspect the work turned out by the women than by our regular run of men employees, for few women have any conception of the importance of dimensions or any judgment as to mechanical strength or requirements. But you can be sure that once a woman employee is taught how to use a gage or learns what constitutes satisfactory work, the good work produced in the afternoon will be exactly the same as that produced in the morning.

We have found it very difficult to teach women the difference between a dull and a sharp cutting tool.

As a rule, the best results are obtained when the supervision of work is under the direction of men, although as immediate superiors of the women other women can be used to advantage.

More attention must be paid to the appearance of the manufacturing departments when women are employed, for women are much more susceptible to surroundings than men. In shops where women work, the

machines and floors are kept cleaner than in sections where men only work.

Shop Clothing

Difficulty with the clothing of women engaged in shopwork has been one of the most important problems we have had to solve. To settle the question once for all, the matter was submitted to the workers in a certain department for their own decision. We had had a few minor accidents due to loose sleeves, uncovered hair and loose skirts, and it was evident that in order to protect our workers it would be necessary to adopt some type of clothing which would remove that industrial risk. We arranged for a conference with our employees in the department mentioned and left to them the selection of the clothes which they should wear. We explained to them the reason we were increasing the number of women, that it was necessary to have these women to take the places of men, that we intended to employ more and more women in the future, but that we could not forgive ourselves if we permitted their employment to result in accidents which might ruin their usefulness in future years. The conference was a most interesting one and the results were surprising; for of those who attended, 98 per cent voted, after a half-hour's consideration, to adopt a uniform factory costume. This has taken its place among other conventions and now receives no special attention. The stock-keepers are exempt from the regulation if they so desire. Many of them, however, have adopted the regulation costume voluntarily.

Segregation of Women Workers

The segregation of operatives has been given a great deal of attention. We now arrange to have our women employees quit their work a few moments earlier than the men so that the women can leave the factory without confusion, but we are making no attempt to separate them from the men in the manufacturing departments. They of necessity work on adjacent machines, for when the man who operates one of a line of machines is called to military duty we cannot move that one machine from its desirable location, but we can train a woman to operate it. Where the number of women in a department is relatively small, the desirability of segregation is most evident, and if it were possible we would segregate operations; but it has not been difficult to entirely control the situation by proper supervision, and now that our men are becoming used to women workers the interruptions and confusion have practically disappeared.

It might be well to say that the men have not objected to women working in the machine shops. While we feel sure that there would have been objections raised last year, this year the men are giving the most helpful assistance in the training of women to do the work properly, for all recognize the importance of carrying on the industrial undertakings by women, as men are required for military work.

We have not been able to impress women with the importance of being on hand every day. Many seem to feel that it will be perfectly satisfactory to be absent occasionally, particularly if they have any household duties to finish, and for this reason we have been careful to select those women who can be entirely relieved of such responsibilities if they enter our employ. Our record of absences of women is as a rule about 20 per cent greater than among men.

We have carried on a most successful experiment in the employment of women in one of the estimating departments. A group of college women are taking up the work heretofore carried on by the younger technical graduates. These young women had no technical training, but we selected those who had specialized in physics, chemistry, or other work of this character. The activity and interest of this group of young women is all that could be desired.

Chester B. Lord, general superintendent Wagner Electric Mfg. Co., St. Louis, emphasized that to maintain the greatest degree of contentment among women workers they should not be allowed too great liberty of

(Continued on page 1460)

Machinery Exports Again Make Record

Shipments of Last September Exceeded—Movement of Semi-Finished Steel Extremely Heavy—Imports Show Decline of 50 Per Cent Compared with Last Year

WASHINGTON, Dec. 11.—Exports of machinery in October again broke all records, exceeding the tremendous shipments of last September. Manufactures of iron and steel by values fell but slightly below the record total of last June, but tonnage commodities showed a substantial decline. The grouping of these figures would suggest that the gain in machinery exports in October was due to higher prices, but an examination of the statistics showing aggregated units indicates a substantial increase in volume as well as in value.

The total exports of manufactures of iron and steel by values in October gained 40 per cent over the same month of 1916 and fell but 4 per cent short of last June's phenomenal record. Shipments of tonnage iron and steel fell 7 per cent below those of October, 1916, but exceeded by nearly 15 per cent the average exports of the past ten months. The exports of machinery rose 55 per cent above the level of October, 1916, and surpassed the record total of September of this year by slightly less than 2 per cent. Shipments of machine tools, which having declined somewhat erratically throughout the past year, gained 13 per cent over October, 1916, but fell substantially below the average of the past 12 months.

For the 10 months ended October, gains were recorded in all classes except metal-working machinery. Exports of iron and steel by values gained 46 per cent over the corresponding period of 1916, which, in turn, exceeded by 140 per cent any previous 10 months. Tonnage commodities surpassed the 10 months of 1916 by the narrow margin of 2.5 per cent, but the 1916 total was 80 per cent in excess of any previous corresponding period. Machinery rose 77 per cent over 1916, but machine tools declined 2 per cent.

Exports of Iron and Steel

	October		Ten Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Pig iron	101,756	.....	404,260	377,094
Ferromanganese .....	.....	3,406	.....	4,545
Ferrosilicon .....	.....	255	.....	4,584
All other pig iron .....	.....	43,539	.....	176,746
Scrap	19,994	6,031	178,346	142,342
Bar iron	4,512	4,823	63,705	44,384
Wire rods	13,927	26,554	132,304	142,128
Steel bars	64,133	46,771	652,886	517,549
Billets, ingots and blooms, n.e.s.	162,679	204,724	1,220,788	1,677,364
Bolts and nuts	2,919	2,502	24,835	207,637
Hoops and bands	3,369	5,638	37,415	47,332
Horseshoes	222	812	7,265	7,229
Cut nails	541	329	4,213	3,349
Wire nails	13,202	13,660	127,912	87,881
Wood screws .....	.....	217	.....	1,073
All other nails, including tacks	1,558	1,659	9,322	16,225
Cast-iron pipes and fittings	9,064	4,350	58,995	59,532
Wrought pipes and fittings	13,617	10,042	124,855	168,219
Radiators and cast-iron house heating boilers	247	249	2,105	4,673
Railroad spikes	1,032	2,507	21,172	17,920
Steel rails	52,752	48,581	444,202	422,453
Galvanized iron sheets and plates	7,892	7,156	69,667	72,190
All other iron sheets and plates	4,317	4,767	38,622	49,069
Steel plates	26,399	50,225	222,893	448,205
Steel sheets	10,315	15,537	88,102	120,439
Ship and tank plates, punched and shaped .....	.....	2,861	.....	2,821
Structural iron and steel	25,342	20,776	237,211	242,222
Tin and terne plates ..	14,177	15,318	193,302	143,374
Barb wire	37,615	10,616	379,534	149,520
All other wire	18,512	18,035	230,078	164,682
Total	610,096	571,893	4,968,285	5,097,764

a Not separately enumerated prior to July 1, 1917.
b Six months ending June 30, 1917.

Exports of Machinery

	October		Ten Months	
	1916	1917	1916	1917
Adding machines	\$129,896	\$192,668	\$1,170,382	\$1,881,335
Air-compressing machinery	74,050	77,034	706,783	865,459
Brewers' machinery	1,133	6,230	12,867	104,129
Cash registers	109,082	26,157	1,377,140	694,479
Parts of	12,946	4,892	121,832	65,645
Concrete mixers .....	.....	a57,757	.....	a105,663
Cotton gins	8,842	5,316	82,546	74,471
Cream separators	12,243	58,040	382,692	526,016
Elevator and elevator machinery	108,256	200,225	1,482,675	1,871,617
Electric locomotives	129,768	10,625	517,858	363,997
Gas engines, stationary	48,547	64,755	319,041	728,720
Gasoline engines	679,935	2,246,155	12,029,208	20,127,933
Kerosene engines .....	.....	a378,319	.....	a1,041,265
Steam engines	764,002	5,178,632	9,042,245	28,008,229
All other engines	412,659	140,681	4,338,943	3,209,463
Parts of	1,794,338	.....	9,654,055	b9,287,545
Boilers .....	.....	a419,448	.....	a1,288,424
Boiler tubes .....	.....	a1,789,970	.....	a3,395,762
All other parts of engines .....	.....	a1,747,386	.....	a5,884,335
Excavating machinery .....	.....	a103,257	.....	a283,035
Milling machinery, flour and grist	96,308	32,960	1,904,287	678,601
Laundry machinery, power	13,005	47,265	254,528	367,100
All other	29,314	23,259	227,773	224,820
Lawn mowers	13,740	24,046	195,922	190,609
Metal-working machinery (including metal-working tools)	5,292,802	.....	68,511,004	b44,604,259
Lathes .....	.....	a1,787,379	.....	a7,340,810
Other machine tools .....	.....	a961,216	.....	a3,522,817
Sharpening and grinding machines .....	.....	a669,108	.....	a2,283,212
All other metal-working machinery .....	.....	a2,565,367	.....	a9,288,463
Meters, gas and water	16,415	58,773	306,254	1,107,764
Mining machinery, oil well	113,519	129,276	1,655,839	1,144,617
All other	892,048	476,240	5,842,025	8,659,019
Paper-mill machinery	286,158	160,661	893,171	1,641,720
Printing presses	189,398	67,450	1,619,442	1,376,529
Pumps and pumping machinery	484,135	523,429	4,556,914	5,106,292
Refrigerating and ice-making machinery	37,896	176,983	582,506	1,012,127
Road-making machinery .....	.....	34,100	.....	125,764
Sewing machines	387,432	646,396	4,597,137	6,572,020
Shoe machinery	103,348	198,326	889,519	1,386,941
Sugar-mill machinery	1,593,401	1,734,054	5,795,566	6,929,023
Textile machinery	245,496	538,826	2,855,481	3,879,000
Typesetting machines	81,294	219,951	959,475	1,051,403
Typewriting machines	789,635	787,770	9,033,015	7,887,000
Windmills	47,264	125,182	855,841	955,322
Woodworking machinery, saw mill	31,676	49,662	353,028	490,694
All other	67,459	77,320	744,642	890,494
All other machinery and parts of	3,381,562	3,665,921	32,363,280	34,405,210
Total	\$18,479,007	\$28,488,426	\$186,234,917	\$232,214,120

a Not separately enumerated prior to July 1, 1917.
b Six months ending June 30, 1917.

Imports of Iron and Steel

	October		Ten Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Ferromanganese	8,114	2,035	65,588	40,910
Ferrosilicon	615	682	5,686	8,489
All other pig iron	6,100	2,156	40,351	18,831
Scrap	11,748	4,894	59,520	172,120
Bar iron	220	2	6,965	2,099
Structural iron and steel	22	591	1,113	4,646
Steel billets without alloys	472	2,506	8,771	31,031
All other steel billets	2,009	610	13,482	6,657
Steel rails	493	668	24,931	7,068
Sheets and plates	73	78	1,380	1,111
Tin andterne plates	110	.....	937	124
Tin scrap .....	.....	694	.....	6,797
Wire rods	183	3	3,467	518
Total	30,169	14,919	233,191	300,401

The value of all exports of iron and steel products in October was \$114,196,743, as compared with \$82,010,972 for the same month of 1916 and \$119,141,972 for June of this year, which is still the record total. For the 10 months of 1917 the total was \$1,025,623,521, as compared with \$701,052,410 for the corresponding period of 1916 and \$294,519,465 in 1915. Exports of machinery in October were valued at \$28,488,426, as compared with \$18,479,007 for the same month a year ago. The largest previous month's exports of machinery were made in September of this year, when the total was \$27,947,134. For the 10 months the exports of machinery were valued at \$232,216,526, as compared with \$186,234,917 for the same period of 1916. Shipments of metal-working machinery aggregated \$5,983,070, as against \$5,292,802 for the same month of 1916. For the 10 months of 1917 the exports totaled \$67,038,833, as compared with \$68,511,004 for the corresponding period of 1916. Details of the exports of machinery in October in 1916 and 1917 and for the two 10 months' periods are given in the accompanying table.

Exports of iron and steel for which quantities are given aggregated 571,893 gross tons in October, 1917, as compared with 610,096 tons for the same month of 1916. The exports of semi-finished material were extremely heavy, being 204,724 tons, compared with 162,679 in October, 1916, and 148,932 in September, 1917. The record total of exports of tonnage commodities, 643,763 gross tons, was made in September, 1916. For the 10 months ended October, 1917, these shipments aggregated 5,097,764 gross tons, as against 4,968,285 tons for the same period of 1916. The accompanying table shows the exports for October and for the 10 months ended October, 1917, as compared with 1916.

The imports for October showed a decline of more than 50 per cent as compared with those of 1916, decreases being noted in receipts of ferromanganese, other pig iron, scrap and alloy steel billets. W. L. C.

A New Electromagnetic Alloy

A new alloy of cobalt, iron and silicon is offered in a patent (U. S. 1,247,206—Nov. 20, 1917) awarded to Frederick M. Becket, of Niagara Falls, N. Y., and assigned to the Electro Metallurgical Co. of that city. The iron and cobalt are said to be present approximately as indicated by the formula Fe_2Co_3 associated with from 2 to 6 per cent of silicon. Typical alloys, according to this invention, analyze as follows:

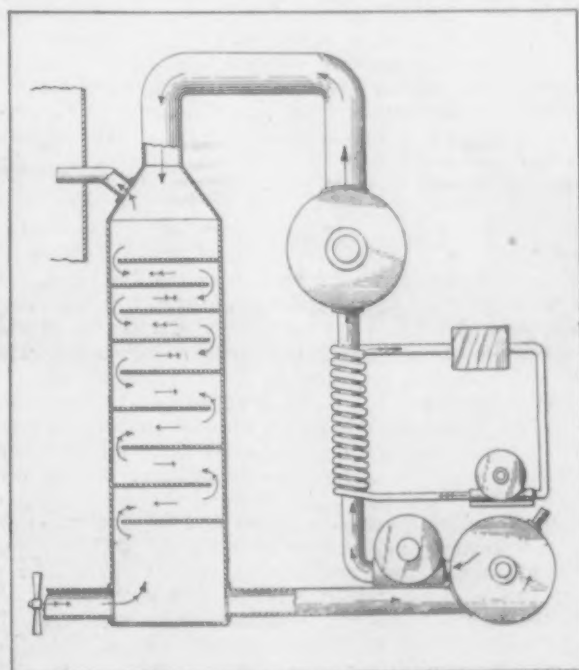
	Per Cent	Per Cent
Iron	60.60	62.93
Cobalt	37.00	32.05
Silicon	2.06	4.69
Carbon	0.09	0.33

It is claimed that the hysteresis value of these alloys is very low and that their magnetic saturation is very high. Within certain limits these properties are said to increase with an increasing silicon content and as large an amount as possible of this element should be incorporated without destroying the malleability. Its advantages are emphasized in connection with transformers, dynamos and other electromagnetic apparatus.

Drying Blast-Furnace Air by Calcium Chloride Brine

IN a paper contributed a few months ago to the Engineers' Society of Western Pennsylvania, Leon Cammen, engineer, 29 West Thirty-ninth Street, New York, described a process of drying air for blast furnace use by passing it through a highly concentrated solution of calcium chloride maintained at a low temperature. Cold brine enters the top of the drier, shown in the illustration, and flows countercurrent to the air entering at the bottom. Leaving the drier the brine passes through an evaporator where its initial concentration is restored, after which it is cooled to a temperature proper for use by a stream of water supplemented by a countercurrent of cold brine going to the evaporator. In the evaporator only a concentration of the brine and not drying of the salt is effected as comparatively low temperatures must be used.

When the brine enters the air drier it is calculated to have a temperature of approximately 16 deg. Fahr. and a concentration of 40 per cent. By the time it



Cold Brine Enters the Top of the Drier and Flows Counter to the Air Entering at the Bottom. Leaving the drier the brine passes through an evaporator, after which it is cooled

leaves contact with the incoming air, it has a temperature of say 25 deg. Fahr., and a concentration of 30 per cent. The incoming warm and moist air is first met by the comparatively warm brine, and as brine at 25 deg. Fahr. and 30 per cent concentration is capable of taking out a large amount of moisture from air at say 80 deg. and a content of seven grains of water per cubic foot, the air is partially dried. This partially dry and fairly cool air will, in its last stage of motion, pass through a layer of 40 per cent brine at 16 deg. Fahr., which is intensely hygroscopic and able to take out all moisture desirable to remove. The brine of 30 per cent concentration and a temperature of 25 to 30 deg. has to be raised to say 180 deg. in the concentrator, but Mr. Cammen explained the actual range of temperature of heating is considerably less with the proper use of the countercurrent principle of operation.

Though the work is several years behind because of strikes and other difficulties, it is probable there will be a further suspension of activity on the new \$50,000,000 Union Station in Chicago. Conferences on the subject have been held by the Chicago Home Defense Committee and the State Council of Defense of which Samuel Insull is chairman. The State Council advises that the work be held up for the duration of the war because of the shortage of steel and other material, as well as of railroad cars and labor.

Important Changes in Tariff Proposed

Commission Makes Recommendations and Congressman Fordney Proposes Immediate Upward Revision—Free Ports May Be Created

WASHINGTON, Dec. 11.—Recommendations of far-reaching importance to the industries of the country, relating both to the tariff and the internal revenue, are contained in the first annual report of the United States Tariff Commission which has just been forwarded to Congress. The commission evidently anticipates an upward revision of the tariff in the near future as well as further increases in internal taxes and lays great stress upon the importance of special legislation in the nature of the "padlock" laws of certain European countries intended to prevent anticipatory importations and withdrawals from bonded warehouses made for the purpose of evading impending higher tax rates. Another extremely interesting suggestion by the commission contemplates the creation of a number of free ports or free zones in which imported merchandise may be received, examined, manipulated, repacked, and re-exported without the payment of customs or internal revenue taxes. The suggestion opens a wide field of trade possibilities and, if adopted by Congress, would no doubt materially assist in the development of our foreign commerce.

Revenue Pending Legislation

The commission makes public for the first time the substance of a series of recommendations it has already transmitted to the Ways and Means Committee in response to a request from its chairman for suggestions concerning the protection of the revenue, pending legislation on the subject. Conforming to this request, the commission called attention to "possible methods of protecting the public treasury against loss and securing what is in effect an increase of revenue during the periods when Congress has under consideration legislation for raising customs duties and internal-revenue taxes." During such periods of legislative deliberation, styled by the commission "interim periods," loss of revenue has been repeatedly incurred. In anticipation of the impending advances in duties, there are unusual importations—both direct importations and active withdrawal of goods from bonded warehouses. Similarly there are large withdrawals from warehouse of articles subject to internal revenue taxes.

The commission suggested that Congress should take steps analogous to those which other countries have taken and which go by the name "padlock laws" in some parts of continental Europe. Increases in duties and taxes could be made to go in effect provisionally, as they do in other countries, subject to the definitive enactment of the pending measures and to ultimate adjustment under the provisions of the measures as enacted. More specifically, it was suggested by the commission that where a bill proposing increases of such taxes was introduced in the House of Representatives by the Committee on Ways and Means, the date of such introduction might be fixed as that on which liability for the new or increased taxes should begin. In view, however, of the difference between American and European legislative and constitutional systems, it was suggested that no actual collection of taxes should take place in advance of the enactment of legislation, but that bonds should be given the Secretary of the Treasury by importers and others liable for the tax, collection to be made eventually at the increased rates as settled on enactment. The constitutional power to deal with the matter in this way, the commission declares, is not open to serious dispute. Congress has the power to make its taxes effective at such dates as it deems expedient.

Judging from Experience

The commission in its report to the Ways and Means Committee called attention to the length of time—usually several months—which elapses between the

first stage of the legislative consideration of revenue laws and their final enactment, and to the probability that interims of this sort are likely to recur in the future. The course of events during the extra session of 1917 has indicated that the same conditions will continue to be experienced whenever important revenue legislation is pending. The war-tax act of 1917 was reported to the House of Representatives by its Ways and Means Committee on May 9, 1917; it became a law on Oct. 3. Nearly five months elapsed between its introduction in the House and its enactment—approximately the same period which had been required for deliberation upon the revenue laws of 1897 and 1913. During these months of 1917, increased customs duties as well as increased internal-revenue taxes were seriously considered. As it happened, no changes in customs duties were finally made; but large increases were made in the internal-revenue taxes. As regards both, the commission asserts the expediency of a permanent system for dealing with interim conditions was again apparent.

Spanish War Legislation

Some effort in the direction of the commission's recommendation has been made by Congress in the past and was made with reference to the act of October 3, 1917. Certain provisions incorporated in the Spanish War revenue act of 1898 provided for the partial collection of increased taxes on goods which had been withdrawn from warehouse under the old rates, but had not yet been completely removed from the channels of trade—the so-called "floor tax." The war revenue act of 1917 contained provisions for the same purpose and by the same method.

These provisions, however, in the opinion of the commission, seem to but partly meet the situation. Much potential revenue collectible under a general statute similar to the European "padlock" laws will always fail to be collected by the mere process of following the goods into the channels of trade. No attempt has heretofore been made to reach smaller retail stocks for the obvious reason that the accruing revenue would not compensate for the expense of collection. Even as regards the stocks of large retailers and of wholesalers the process of collection by this method would be both uncertain and expensive. Investigation by the commission indicates that the collection of floor taxes after the passage of revenue laws would usually result in securing less than half the amount obtainable if the anticipated increases in taxes could be applied to imported goods at the custom houses or to goods subject to internal taxes before leaving the factories. Moreover the process of thus following the commodities into the channels of trade suddenly imposes great burdens and responsibilities on the Government, calling for the organization of a large force for gathering and investigating an enormous number of returns, many of them involving small amounts and this for a temporary purpose only.

Important Considerations

The commission, therefore, earnestly recommends to Congress the enactment of a law dealing with this problem systematically and providing in some way for the safeguarding of the revenue during interim periods. The precise mode in which this may best be accomplished is doubtless a matter for careful consideration. The commission has suggested that bonds shall be required for the payment of such increased duties as may be eventually levied, and that these bonds be required from some fixed date preceding final enactment. The examples, reviewed in the commission's special report, from England, France, Italy, and other foreign countries, where such changes in taxes when proposed by

the Government became almost instantly effective; the evidence available as to the loss of revenue in times past during interim periods; the possibility that large demands for new revenue may be made at an early date; and the certainty that in the more or less distant future increases in tax rates will again be made—all these considerations lead the commission to ask once more the attention of Congress to the desirability of some systematic method of dealing with the problem.

A Possible Difficulty

The commission further calls attention to another aspect of the problem, and to a possible difficulty concerning which it has gathered additional evidence. It is conceded that an objection likely to be raised to the whole proposal is that any provisional collection of duty or any requirement of bonds for the final payment of duties proposed but not yet enacted, will lead to uncertainty and disturbance in business conditions. It appears to the commission, however, that uncertainty of this sort is inevitable under any system; and, moreover, that the business community finds it possible to adapt itself without serious embarrassment to such uncertainty. During several months of 1917, from May until August, increases of customs duties were under consideration in Congress on a considerable scale under the revenue bill as passed by the House, and also, though not so comprehensive, in the bill as considered in the Senate. During this time, importers and other business men had to face the possibility of changes in duties and had to accommodate their sales and purchases to that possibility.

Inquiry by the commission among leading importers disclosed a widespread adoption of protecting clauses in contracts for future delivery. These contracts provided that all increases in duties pending delivery should be borne by the purchasers. The commission has in its files forms of contracts containing clauses which were thus inserted, providing for the modification of contracts and it believes the insertion of such clauses in future contracts will doubtless become an established practice. Their use became customary with little friction between customers and importers and with trifling disturbance of business, if any. It appears also that for several years clauses of this sort have been inserted in contracts affecting various commodities.

Uncertainty as to Prices

The uncertainty as to final prices which was necessarily occasioned by pending changes in tariff legislation, the commission declares, appears to have caused no substantial business complications. The signatures of vendees on contracts protecting vendors against possible customs increases were for the most part obtained without difficulty. It may be fairly inferred that if importers or other vendors had to give bond for the final collection of pending duties and taxes, clauses providing for corresponding advances in prices by vendors, in case the duties or taxes were definitely enacted, could be carried into execution with no great difficulty.

Still a further question arising in connection with increases of duties relates to outstanding contracts. The commission suggests that persons who before the date fixed for the coming into effect of the new legislation, in good faith had made contracts for the delivery of goods, should be in some way safeguarded. This could be done either by placing on the vendee the burden of unanticipated increases of duties or taxes, or by allowing refunds to the vendors from the Treasury on satisfactory proof of contracts made in good faith before the prescribed date. The former method obviously is the more advantageous for revenue purposes. It is the method which was adopted long ago by Congress, in the revenue act of 1864; then vendors were allowed to collect from vendees whatever increased taxes the vendors had been unexpectedly called upon to pay. To some extent the same method was adopted by Congress in the war revenue act of October 3, 1917, as applying to sales of automobiles, sporting goods, mechanical musical instruments and a considerable variety of other articles. In anticipation of the objection that such a practice of calling upon vendees to pay newly levied and unexpected taxes would cause

uncertainty and disturbance of current business operations, the commission expresses confidence that the business community would adapt itself to such a condition without serious hardship.

Free Zones Proposed

The recommendation of the commission for the creation of free ports or free zones which, it is understood, are to be located at New York, San Francisco and New Orleans, will be examined by business men with the liveliest interest. In this connection, the commission says:

The administration of bonded warehouses and the system of granting drawbacks, in connection with re-export of foreign goods, at once suggests the alternative of free ports, or, more accurately free zones in ports. In briefest outline a free zone in a port is an inclosed and guarded area where imported goods may be landed and held without custom-house inspection or charge. They may there be stored, mingled, repacked, manipulated, and even manufactured. Such goods as are re-exported may be loaded and shipped without payment of duties or custom-house interference. Goods having a destination in the country in which the free zone is located pass through the custom house to their destination, subject to all checking inspection and custom charges, just as if passing through the regular present channels. Thus the free zone, while practically a warehouse duly guarded to protect the customs revenues of the home country, affords an open trade route for foreign commerce.

There are obvious advantages in a system which by eliminating the delay necessarily incident to checking and accounting in the custom house, shortens the demurrage of foreign-bound cargoes and ships and evades the complications of the bonded warehouse and drawback systems. In some foreign countries, notably in the experience of Hamburg and Copenhagen, the free-zone system has proven of great value.

A careful survey must be made before it would be safe to assume that the plan would be successful or workable in the United States. In this connection the commission is endeavoring to ascertain in detail, first, foreign methods, practices, and results and the specific advantages which merchants and carriers would expect to result from the privilege; second, the requirements that should precede the granting of the privilege, such as present and prospective commerce, trade routes, natural advantages, connecting transportation, the facilities that should be furnished by the local communities, the benefits that might be expected to accrue to the aggregate of the national commerce, and also the objections that might be urged.

To the end of securing such information, investigations are under way in three large importing cities situated, respectively, on the Atlantic, the Gulf, and the Pacific.

The commission announces that as the result of an elaborate investigation it has prepared a tentative draft of a proposed revision of the customs administrative laws designed to eliminate obsolete provisions and to bring inconsistent requirements into harmony and to render this entire body of laws more responsive to the requirements of our growing foreign trade. Confidence is expressed that if this proposed statute can be speedily enacted by Congress, clearness and simplification in the form and substance of the customs administrative laws will be combined with increased efficiency, greater convenience for the public, and a substantial saving in Government expenditures.

Upward Revision of the Tariff

The Tariff Commission's recommendations respecting legislation to prevent anticipatory importations and withdrawals are given additional interest by declarations made since the reconvening of Congress by Chairman Kitchin and Representative Fordney, the ranking Republican member of the Ways and Means Committee. Mr. Kitchin, in an interview, foreshadows further taxing legislation at the present session, declaring that the length of the war will be measured by the patience of the American people under the impending burden of taxation which, he says, will be increased "until it hurts."

Representative Fordney strongly advocates an immediate upward revision of the tariff so as to secure between \$200,000,000 and \$400,000,000 additional revenue from this source.

W. L. C.

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Proposed Revision of the Tariff

From the very beginning of the great war, it has been evident that some steps toward the revision of the tariff should be taken before the restoration of peace. No man, no matter what his convictions as to free trade and protection, could predict with any degree of certainty what would happen at the end of the war. The one thing that could be called certain was that conditions would be far different and that the tariff systems of all countries would likely be revised.

The United States Tariff Commission has found that its duties are very different from what they were expected to be when the commission was created; but it is showing a disposition to adapt itself to war conditions and has submitted a valuable report to Congress, which is reviewed elsewhere in this issue by our Washington correspondent. It is a notorious fact that whenever an upward revision of the tariff is pending, large quantities of imports are brought in and heavy withdrawals from warehouses take place. The commission proposes that Congress shall take steps similar to those of other countries to prevent losses by the Government on account of increased importation and withdrawal from warehouses. This task is beset by many difficulties, but the commission has gone into the subject thoroughly and promises to do much in helping Congress to pass satisfactory legislation. The suggestion of the creation of free ports or free zones at New York, San Francisco and New Orleans is highly interesting and will arouse no little discussion.

In connection with the recommendations of the commission, the general subject of tariff revision has come up, and the proposal to bring about immediate increases to obtain from \$200,000,000 to \$400,000,000 additional revenue ought to appeal very forcibly to members of Congress. Such a step would be in harmony with the time-honored tariff for revenue policy of the party now in power and it would also afford some degree of protection against a sudden increase in importations at the close of the war. Official figures prepared by the Treasury Department show that for the fiscal year 1917 the United States collected in import duties only \$2.20 per capita, while England collected \$7.78. At a time when the demands upon the Government for many kinds of expenditures are tremendous, the

people of the United States might well be willing to pay an indirect tax of say \$5 per capita if it has been found practicable in England to raise over 50 per cent more.

The Country's War Organization

Poorly organized for war, the country is rushing the development of its war machine with slight chance of a much closer approach to the ideal organization for a good many months to come. Such is the impression obtained from a meeting in Washington last week of the Taylor Society, which aims at the promotion of scientific management, having a number of its members in Government service on organization work and otherwise. Apparently very slow progress is being made in co-ordination among departments, so that, for example, when a given ship is known to be approaching the coast the cargo for that ship is not gathered on the wharf ready for rapid loading. The chaotic condition of railroad transportation is of course the result of no single-ness of head; but even were authority centralized, there is no advisory authority which, with advance knowledge of what is to be moved and the when and where, can do the planning. Admitting the mushroom growth which has necessarily marked all departments, with the natural result that many men are engaged in work for which they have had little previous training—due of course to a demand exceeding the supply—there is nothing to tie the departments together even after they become, as some of them already are, independently proficient. The inaccessibility of the President of the United States is regretted, having reference in particular to the fact that he has little contact with even the leading boards. He fails to realize, in the opinion of at least one speaker at the Washington meeting, that while an effective manager is a man an effective adviser is a board.

A vast deal is apparently being done to develop a highly effective organization, tied together at the top by advisory boards, and it is reassuring that men well tried in organization work are spending all their time at Washington to make sure that these bonds are tightened.

P. P. Claxton, United States Commissioner of Education, is giving some very sound advice to high school and college men, especially those taking

technical courses. After saying that the universities of the warring nations are losing students rapidly and those in this country have also lost to some extent, he urges students to remain at their studies instead of enlisting. He points out that there will be plenty of time for them to help their country and that the United States after the war will be badly in need of trained men to help in rebuilding the devastated areas of Europe as well as in carrying on engineering projects in this country. It is natural for boys to be governed by the "gang" spirit and to rush into places where excitement prevails, but now more than ever is the time for cool heads and hard work in the colleges of the country. The Secretaries of War and Navy are discouraging the wholesale enlistment of college men, and it is to be hoped that all the sound advice that is being given will have a deterring effect.

Future Status of the Railroads

Whether one likes it or not, the special report made to Congress last week by the Interstate Commerce Commission is in essence a criticism of the treatment that has been given the railroads. The report, it is true, centers around two propositions, whether the Government should take over the railroads, for operation by the President, or should provide that the railroads form one pool for the whole country, under their own management. The circumstances leading up to the necessity for advocating an immediate choice between these two alternatives and no other show that there was already something wrong with the system before the war started.

Although the railroads have made sacrifices, in foregoing the handling of some profitable freight, and the traveling public has been forced to make sacrifices through the annulment of a considerable volume of passenger service, the railroads are unable to handle expeditiously all the traffic that is offered them. This condition is commonly attributed to the fact that we are at war, but more simply and directly it is because the country is busy. The country has a right to be busy, and as busy as it is now, in time of peace. Railroad facilities ought to be adequate for such a condition.

Furthermore, it is stated that it is difficult if not impossible for the railroads to secure additional equipment because men and materials are scarce. Such a condition could also occur in time of peace. Mention is made of the fact that it would be difficult for the railroads to borrow money at this time. In time of peace scarcity of men and materials also arises, and there are also times when the railroads cannot borrow money. The Interstate Commerce Commission has used the term "vicious circle" with reference to alternate advances in freight rates and in wages, but that opprobrious term can as well be applied to the familiar condition that when labor and materials are cheap, for extensions, the railroads cannot borrow, and when they can borrow, labor and materials are scarce and high priced.

There cannot be complete acquiescence, therefore, with the view that the railroad crisis has occurred solely because the country is at war. Likewise there cannot be complete acquiescence with

the rather common view that it is one of the misfortunes of war that radical action must now be taken to put the transportation facilities of the country upon a new and better basis. It is a blessing, and one without much disguise. It is true that some of the misgivings are due to fears of what may occur after the war; that what is done now may furnish a basis for trouble afterwards. But if we can wage this war successfully, we should be fully equipped for handling the problems that arise thereafter. It has been well said that nothing matters much now but winning the war. Equally well it may be said that if after being tried by fire we are found wanting nothing will matter much afterwards.

It is a good thing, not a misfortune, that the war has brought the country face to face with this problem of the railroads. The solution will necessarily to some extent savor of war time expediency; but there should be the advantage of most of the steps taken being in the right direction, with the further advantage that experiments that result unfavorably will furnish information, yet the expense of making them can be charged to the account of the war.

The greatest fear of Government operation of railroads has been politics. It is both unsafe and unwise at any time to seek to minimize this menace, but it would be equally unwise to ignore the fact that politics is likely to be quite different after the war. In the first place, the politicians are learning lessons as to what can be done by co-operation and are given a great opportunity to see that the business men of the country are really in the main very reputable persons, full of patriotism, energy and ability. In the second place, the voter is learning a great deal. Both by precept and force of circumstances he is learning to economize. He has learned a great deal about negotiable securities and the value of credit behind them. It is not conceivable that the voter in future will support politicians of the stripe that has been so common in the past.

Politics is not likely in the future to be as great a menace to a closer working between the Government and the railroads as it has been hitherto. The admission that competition as a means of improving railroad service has broken down is complete. We are ready for the adoption of a new policy, and the emergency of war requires that the solution be found promptly. In form the solution will be temporary, but in it there will be some permanent and important substance. It will not be a case of adopting an emergency program and then after the war going back entirely to former conditions.

The war may bring into existence some things that it will be necessary and at the same time difficult to get rid of afterwards. But the condition with respect to the railroads was such that practically any substitute was welcome. It was a case of there being everything to gain.

There is one unfortunate thread running through the whole incident of the Interstate Commerce Commission making this special report to Congress and calling upon that body to take action. This action of the commission was taken just as it had before it the reopened 15 per cent rate advance

case. On one basis or another for years past the commission has refused to grant rate increases which the railroads and many reputable thinkers outside the railroads felt should be granted. The cynical might say that the commission found its supply of arguments gone, in dealing with the officials representing the various railroad companies, and as the opportunity was afforded embraced this new means of avoiding a rate decision favorable to the railroads.

How Congress will approach this matter, how many propositions it will develop from the situation of having before it two clear-cut alternatives from which to make a choice, cannot well be predicted. It is interesting to note that meanwhile the General Operating Committee, to which was entrusted the operation of the limited pool decreed by the Railroad War Board on Nov. 24, is proceeding energetically with its work as already marked out and giving no official attention to the new phase of the railroad situation presented by the Interstate Commerce Commission's special report to Congress. The committee's work has already borne some fruit, and this week it has proceeded farther in pooling operations, directing that primary and terminal coal pools be formed to relieve the Michigan fuel situation.

Secretary Daniels' discussion of the fixing of prices for naval contracts and the determination of fair methods of cost accounting, in his report to Congress, is extremely interesting. Much care has been taken to avoid extravagance, but probably the weakest point is that relating to labor. The Secretary states that no large expenditures for material can be made until the price has been approved by the compensation board, and the inspection system of the department is such that it is believed "no large extravagance or misdirection in labor can escape detection and correction." It is well known, however, that in many cases exorbitant wages have been paid for labor under the cost-plus system at cantonments and elsewhere, and the result has been that manufacturers in the neighborhood have lost many of their employees and have often been compelled to raise wages more than other employers not competing with the Government were compelled to do. This is manifestly unjust, and Government officials should spare no pains to curb the practice.

CORRESPONDENCE

Freight Handling Methods Greatly Need Betterment

To the Editor: The "Eastern Railroad Pool" editorial in the current number of THE IRON AGE is most interesting. Much is being written these days about the work that is facing the railroads and the great improvements that have been made in the service. One feature that is most important, to my mind, seems to have been overlooked to a considerable extent.

It is surprising that railroads, the masters of transportation and freight haulage, should still employ the old "husky" with the hand truck on freight platforms and in terminal sheds when power is available for this work and can be used at a great saving of time, labor and money. At the same time cars and boats can be

freed from loading and unloading delays in terminals more quickly and kept in active service a much larger part of the time.

Bulk freight such as coal and ore is being handled at the big terminals by power at a very small cost per ton and very quickly. The same class of freight in smaller centers is still handled by the man and shovel method. Simple machines can be had for this work that will materially reduce the time required to unload cars at these points.

If only one man is eliminated from this work at a terminal, an investment will be warranted that will far exceed the cost of the machinery to do the work. Wages are high and are going higher. Men are scarce and are going to be scarcer. More and more freight is going to be offered as time goes on. The railroads should realize that demands on them will be heavy long after peace is declared.

L.c.l. freight is being moved about terminals, into cars and from cars by the same methods that were in vogue at the time the first shed was erected. What excuse can be offered for neglecting this branch of railroad work? Every other department has constantly been improved. Machines are available that will reduce the manual labor required to handle this freight with remarkable savings and at the same time materially shorten the length of time that cars must be held for loading and unloading.

A short time ago the Railway War Board bulletin stated that the railroads were short 45,000 cars. This shortage, I believe, is largely due to the methods of handling freight at the "necks of the railroad bottles," namely, the terminals and unloading yards. It is reasonable to expect that by speeding up loading and unloading methods much of the congestion and car shortage can be eliminated.

A liquid can be poured from a bottle, yes; but it flows more rapidly from a pail or from a bottle if there is a suction on the bottle or a pressure back of the liquid. I suggest that a suction by means of mechanical freight handling and trucking methods be put to work in the terminals and transfer points.

I am sending herewith examples of what has been done at one freight terminal. [Illustration of electrically driven trucks in freight houses.—ED.] While they only illustrate the use of one style of freight handling equipment, they can be taken as indicative of what may be expected from improved methods. No one type of equipment will solve the problems of all terminals any more than one medicine will cure all the ills of the human family.

The writer is not interested in the sale of any of this class of equipment and the information given has resulted from an extensive investigation that led him into many of the largest and most important terminals east of the Mississippi River. Everywhere the lack of mechanical handling equipment was woefully evident.

F. C. MYERS,

Society for Electrical Development, Inc.

New York, Dec. 8, 1917.

Small Decrease in Steel Corporation Orders

Unfilled orders on the books of the United States Steel Corporation on Nov. 30 were 8,897,106 tons, a decrease of 112,569 tons from those reported for Oct. 31. This decline contrasts with one of over 800,000 tons in October and of about 570,000 tons in September. The November report shows the smallest aggregate since Feb. 29, 1916, when the unfilled orders were 8,568,966 tons, and the seventh successive monthly decline. The following table gives the unfilled tonnage at the close of each month since January, 1914:

	1917	1916	1915	1914
January	11,474,054	7,922,767	4,248,571	4,613,680
February	11,576,697	8,568,966	4,345,371	5,026,440
March	11,711,644	9,331,001	4,255,749	4,653,825
April	12,183,083	9,829,551	4,162,244	4,277,068
May	11,886,591	9,937,798	4,264,598	3,998,160
June	11,383,287	9,640,458	4,678,196	4,032,857
July	10,844,164	9,593,592	4,928,540	4,158,359
August	10,407,049	9,660,357	4,908,445	4,213,331
September	9,833,477	9,522,584	5,317,618	2,787,667
October	9,009,675	10,015,260	6,165,452	3,461,697
November	8,897,106	11,058,542	7,189,489	3,324,592
December		11,547,286	7,806,220	3,836,643

Labor Shortage Survey in New York State

WASHINGTON, Dec. 11.—To determine whether there is actually a labor shortage in the United States and why there exists, in some places, an apparent dearth of employment along with this labor shortage, the Department of Labor, through its employment service, is conducting a survey of labor conditions in the State of New York. The survey, when completed, will show what proportion of women is replacing men in industries. To date, the survey has covered 37 cities in New York State.

The war order firms scheduled in 29 cities employ 168,446 people. Some 23,048 additional workers, or a number which is less than 14 per cent of the existing labor force in those industries, are definitely necessary. One firm which is pushing to rapid completion a new plant covering 40 acres has requested 13,323 workers.

Schedules also show that of the calls for extra employees 1400 of the 23,000 were obviously not warranted or at least of doubtful validity because of business conditions or because of the existence of labor disputes. About one-fourth of the 500 firms, 128, are represented in these calls and measured by the number of their employees the call for additional help is equal to about a third of the force already on the rolls of the establishments.

The industries making the largest calls for labor are, in the order named, airplanes and seaplanes (the call from which constitutes 57 per cent of all the labor asked by the 128 firms); ordnance and ammunition; iron and steel castings and forgings; machinery; scientific instruments and optical supplies; knit goods; electrical apparatus and supplies; chemicals, and trucks and motor vehicles. To date no industry scheduled has called for as many as 300 workers and many are asking for smaller numbers.

Employment of Women

As yet there are comparatively few women—only about 300—called for on the schedules to take the places of men. These are confined practically to the Rochester instrument and tool-making firms. Even there the call is for "men or women." The wages offered the women cannot be compared with those offered men, except by a test, as men are paid on a time basis and women are offered piece rates.

One Elmira firm, although it does not appear in the schedules as calling for women to take men's places, actually has substituted 400 women, and by advertising cards has announced its intention of substituting 1100 more very soon. This firm's action has called forth a vigorous protest from organized labor in Elmira, because of lower wages reported to be paid to the women.

Unrest in War Order Plants

At this stage of the survey, it appears that there is more unrest in establishments working on direct war orders than in plants otherwise engaged, owing to the conviction of organized labor that the direct war order firms are taking excess profits.

A remarkable fact revealed by the schedules is that those firms which are calling for extra employees and those which are either not taking on extras or laying off workers are frequently within the same industry, the exceptions being a few cases where a firm has completed large orders and is waiting or making adjustments for new orders. Factories making gears and other machinery for pleasure automobiles are laying off help while the makers of trucks and other service machines are calling for more labor. W. L. C.

The Imperial Munitions Board, Ottawa, Ont., has placed orders with the Coughlan's Shipyards, Ltd., Vancouver, B. C., amounting to \$7,254,000, and provides for the construction of 4 additional, 8800 ton steel freight steamers, turbine propelled, similar to the six already under construction at the company's yards. The Coughlan Shipyards have now building contracts to the value of more than \$15,000,000.

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Organizing to Cause Strike Is Illegal

Important Decision by the Supreme Court of United States Severely Condemns Malicious Acts of Unions—Three Justices Dissent—Gompers Protests

WASHINGTON, Dec. 11.—In one of the most notable opinions handed down by the United States Supreme Court in a case involving the rights of labor, Mr. Justice Pitney, with the concurrence of the chief justice and four of his associates, holds that an attempt to unionize the employees of a non-union establishment for the purpose of bringing on a strike or otherwise injuring the owners thereof is "malicious in the law" and may be enjoined, and that it is erroneous to assume that all measures which may be resorted to in the effort to unionize a non-union establishment are lawful if they are peaceable, because any violation of the owner's legal rights, contrived for the purpose of inflicting damage, or having that as its necessary effect, is as plainly contrary to law as if it involved a breach of the peace. Justices Brandeis, Holmes and Clarke dissented from the opinion of the court.

The case ruled upon was a suit in equity brought by the Hitchman Coal & Coke Co., owner of a coal mine in the Panhandle district of West Virginia, against certain officers and members of the United Mine Workers of America. At the time the suit was commenced, and for a considerable time before, the mine was operated "non-union," under an agreement between the Hitchman company and its men to the effect that the mine should be run on a non-union basis, that the employees should not become connected with the union while employed by the company, and that if they joined it their employment with plaintiff should cease.

The general object of the suit was to obtain an injunction to restrain the defendants from interfering with the relations existing between the Hitchman company and its employees in order to compel the company to unionize its mine. It was brought in the United States District Court for the Northern District of West Virginia, where the decision was in favor of the plaintiff. The Circuit Court of Appeals reversed this decree and ordered the bill of complaint to be dismissed. The case was then brought to the Supreme Court by writ of certiorari.

Facts of the Case

The facts of the case were that the Hitchman company, after running its mine for three years under a closed-shop agreement with the union, during which time it had three costly strikes, established the mine on a non-union basis, under individual agreements with the men that they should not be members of the union while employed by the plaintiff; and that defendants, having full notice of this working agreement, acting as representatives of the United Mine Workers' Union, and in order to subject plaintiff to such participation by the union in the management of the mine as would result from the making of a new closed-shop agreement, sent an agent or organizer, named Hughes, to the mine, who proceeded, without physical violence, but by persuasion accompanied with deceptive statements as to the attitude of the mine management, to induce plaintiff's employees to join the union, keeping secret the number and the names of the men who agreed to join, and permitting them to remain at work in the mine, with the object of securing the consent of a sufficient number of the men, so that by stopping work in a body they might compel the closing of the mine, and thus cause the company, by fear of losses through the stoppage of operations, to "recognize" the union and make a closed-shop agreement with it.

Similar efforts were made at the same time to organize other non-union mines in the Panhandle district, with the result that defendants succeeded in shutting down one of these mines, and had made considerable progress at two others (including the Hitchman mine), when they were stopped by restraining orders issued by the United States District Court.

Company Entitled to Protection

The Supreme Court holds that the plaintiff was acting within its lawful rights in employing its men upon the terms that they should not be members of the United Mine Workers of America; that, having established this working agreement between it and its employees with the free assent of the latter, plaintiff is entitled to be protected in the enjoyment of the resulting status as in any other legal right; that the fact that the employment was terminable by either party at any time made no difference, since the right of the employees to strike or to leave the work gave no right to defendants to instigate a strike; that plaintiff was and is entitled to the good-will of its employees precisely as a merchant is entitled to the good-will of his customers, although they are under no obligation to continue to deal with him; that the value of the relation lies in the reasonable probability that by properly treating its employees and paying them fair wages and avoiding reasonable grounds of complaint plaintiff will be able to retain them in its employ, and to fill vacancies occurring from time to time by the employment of other men on the same terms; and that defendants could not be permitted to interfere with these rights without some just cause or excuse.

By way of justification or excuse, defendants set up the right of workmen to form unions and to enlarge their membership by inviting other workmen to join. The opinion of the court freely concedes this right, provided the objects of the union be proper and legitimate, which is assumed to be true, in a general sense, with respect to the United Mine Workers of America. But the court holds that it is erroneous to assume that this right is so absolute that it may be exercised under any circumstances and without any qualification; that, in truth, like other rights that exist in civilized society, it must always be exercised with reasonable regard for the conflicting rights of others, according to the fundamental maxim "So use your own property as not to injure the rights of another." Hence, assuming defendants were exercising the right to invite men to join their union, nevertheless, since they had notice that plaintiff's mine was run non-union, that none of the men had a right to remain at work there after joining the union and that the observance of this agreement was of much importance and value both to plaintiff and to its men who had voluntarily made the agreement and desired to continue working under it, defendants were under a duty to exercise care to refrain from unnecessarily injuring plaintiff; yet they deliberately and advisedly selected that method of enlarging the union membership which would inflict injury upon plaintiff and its loyal employees, by persuading man after man to join the union, and, having done so, to remain at work, keeping the employer in ignorance of their number and identity, until so many should have joined that by stopping work in a body they could coerce the employer and the remaining miners to organize the mine, and that the conduct of defendants in so doing was unlawful and malicious.

Union Claim Set Aside

To the suggestion that under the existing contract an employee was not called upon to leave the mine until he actually joined the union, and that the organizer only tried to get the men to agree to join, and did not attempt to induce them to break their contracts by remaining at work after actually joining, the Supreme Court holds that in a court of equity, which looks to the substance and essence of things and disregards matters of form and technical nicety, to induce men to agree to join the union for the purpose of shutting down the mine was the same, for practical purposes, as

if they actually became members of the union; that it needed no formal ritual or taking of an oath of membership to constitute them such; their uniting with the union in the plan to subvert the system of employment at the Hitchman mine, to which they had voluntarily agreed and upon which their employer and their fellow-employees were relying, was sufficient to constitute them members for practical purposes.

But the court further holds that what the defendants were endeavoring to do at the Hitchman mine and neighboring mines was not a *bona fide* effort to enlarge the membership of the union, since the new members were not desired or sought except as a means to the end of compelling the owners of the mines to change their methods of operation.

The court further holds that defendants were not pursuing their object by lawful means; that the question of their *bona fide* intention entered into the question of malice; that the intentional infliction of damage upon another without justification or excuse is malicious in the law, and that the excuse set up by defendants could not be regarded as a just cause or excuse because it was based upon the assertion of a conflicting right that was sought to be obtained by unfair methods and for the very purpose of interfering with plaintiff's rights, of which defendants had full notice.

Not Necessarily Peaceable

The court declares that it is erroneous to assume that all measures which may be resorted to in the effort to unionize a mine are lawful if they are peaceable—that is, if they stop short of physical violence or coercion through fear of it; the court holding that any violation of plaintiff's legal rights contrived by defendants for the purpose of inflicting damage, or having that as its necessary effect, is as plainly contrary to law as if it involved a breach of the peace, and that a combination to procure concerted breaches of contract by plaintiff's employees constituted such a violation.

That defendant's acts cannot be justified by analogy to competition in trade; that if a competing trader should endeavor to draw custom from his rival not by offering better or cheaper goods, employing more competent salesmen, or displaying more attractive advertisements, but by persuading the rival's clerks to desert him under circumstances rendering it difficult or embarrassing for him to fill their places, a court of equity would grant an injunction to restrain this as unfair competition.

Summing up the matter, the court holds that the purpose of defendants to bring about a strike at the mine in order to compel plaintiff through fear of financial loss to consent to the unionization of the mine as the lesser evil, was an unlawful purpose, and that the methods resorted to by the organizer—the inducing of employees to unite with the union in an effort to subvert the system of employment at the mine by concerted breaches of the contracts of employment known to be in force there—were unlawful and malicious methods, not to be justified as a fair exercise of the right to increase the membership of the union. And that since plaintiff was threatened with danger of an immediate strike and irreparable damage as the result of defendants' efforts, it was entitled to be protected by an injunction, and for that reason the decree of the Circuit Court of Appeals must be reversed.

Gompers' Comment

Samuel Gompers, president of the American Federation of Labor, in a statement last night characterized the decision as "far-reaching and unwarrantable." He said:

"To hold that the United Mine Workers of America is an unlawful organization or that it is a conspiracy is to hark back to the days when employers were monarchs of all they surveyed and their employees were servants or slaves. The miners' union undertook by perfectly lawful methods and means to reach the unorganized and underpaid miners of West Virginia so that they might be treated as men and as citizens, with the responsibility of maintaining families upon an American standard."

W. L. C.

FINALLY DISSOLVED

Council of National Defense Pays Handsome Tribute to Business Men

WASHINGTON, Dec. 11.—In an announcement finally dissolving the original trade committees appointed to co-operate with the Advisory Commission, the Council of National Defense pays a handsome tribute to the services of the hundreds of business men who have performed valuable work as members of the various committees. The council suggests that new committees chosen by the industries themselves will be able to carry on the work already on foot and promises hearty co-operation.

"The Council of National Defense," it is stated, "was established to bring about the co-ordination of industries and resources for the national security and welfare. Previous to the entrance of this country into the war, steps were taken by the council so to mobilize the industries of the country that they could render effective assistance to the nation in its hour of need. The crisis made imperative the necessity for prompt action. Since instant steps were necessary, the Council of National Defense authorized the formation, under its direction, of co-operative committees of industry, to be composed of men representative of their respective lines.

"These committees have given faithful, patriotic and invaluable assistance to their country. Many of the individuals serving on them have done so only at great personal and financial sacrifice. The thanks of the entire country are due to these men, who unhesitatingly and unselfishly responded to the Government's appeal for aid.

"Technically, however, this necessary emergency machinery set up by the council was not in the administrative sense ideal as a means for making permanent the mobilization of industry in a democracy at war. Practically it was effective, but the committees were placed before the public in a position unfair both to themselves and to the Government. The council and its War Industries Board, after giving this matter serious thought for some weeks, have concluded that it is now possible to arrange for meeting the Government's needs through the appointment of highly qualified individuals as Government employees and expert advisers, and also to meet the needs of industry as well as to assist the Government by representative committees created not by the Government, but by the industries themselves.

"It, therefore, has become feasible to discontinue the embarrassing situation wherein the members of the present committees are apparently called upon to act both as Government agents or advisers and at the same time as representatives of the industries. In dissolving the present co-operative committees of industry, the action is taken only with the highest praise and thanks for their splendid and indispensable work, and at the same time with the hope that representative committees of the industry will be formed by the industries themselves at the earliest possible moment.

"The establishment of such committees, formed so as to entitle them to speak for their entire industries, will render immediately available valuable sources of information upon which the Government can draw in connection with the countless business and industrial problems attendant upon the conduct of the work necessary for the prosecution of the war."

Frame barracks under construction in the vicinity of the plant of the Nash Motors Co., Kenosha, Wis., for the accommodation of from 150 to 200 officers and enlisted men of the United States army, were destroyed by fire last week when practically completed. The fire is believed to have resulted from the explosion of small cans of roofing cement. New buildings already are under way. The Nash company is manufacturing motor trucks for the army and the barracks will be used by soldiers who are acting as inspectors and also those being trained in the construction, maintenance and repair of army vehicles.

Iron and Steel Markets

FEW CHANGES IN PRICES

Present Schedule Likely to Remain

Freight Troubles Increased by Snow—Government Needs Are Growing

The Washington conference between the Government and steel makers and the more serious turn in the railroad situation due to snow and zero weather have largely occupied the iron and steel trades and business has been secondary.

Contrary to expectation, the Washington meeting was called with no definite proposal in the minds of the Government representatives. There was no discussion of specific prices, but the situation was canvassed with reference to the latest data obtained from the manufacturers by the Federal Trade Commission showing increased cost of production. The commission's findings will now be gone over with the manufacturers at Washington, Dec. 14, and later the War Industries Board will appoint a meeting with the Steel Committee before Jan. 1. Indications are that few if any changes will be made in the present price schedule and that it will continue after Jan. 1.

The pendency of the Pomerene bill for full Government control of the steel industry is an important reason in the minds of the Government's representatives for not disturbing the market at this time, though a portion of the Federal Trade Commission still favors reductions in basic products.

With no authority which can give assurance of stable prices, consumers are cautious in buying. This is true particularly in lines of product in which Government wants are not dominating. As to plates, shapes, bars and forging steel the average buyer appreciates that contract deliveries are entirely subject to war priorities.

Saturday's blizzard made havoc of the plans of the general operating committee of Eastern railroads at Pittsburgh. A better movement of coke had helped Youngstown blast furnaces to start up, but the coal situation again became desperate. At Cleveland nine plants of the American Steel & Wire Company have been shut down since Saturday for lack of coal, five blast furnaces being banked.

Specifications for Government steel are going to the mills faster than has been counted on, and some classes of mills are more fully occupied on war account than seemed likely two months ago. Yet there are gaps due to lack of team work. For example, Canadian plants having contracts for American shells complain of the slowness with which orders for the steel are sent out from Washington to the makers here.

The pig-iron market is working steadily toward a condition in which consumers without war orders

will find it well nigh impossible to secure iron. Philadelphia continues to lead in the volume of new buying. About 60,000 tons was bought there in the week, 30,000 tons being basic for delivery over the first half of 1918. For Pencoyd, Pa., and Worcester, Mass., steel works it is expected that basic iron will be brought from Alabama furnaces of the Steel Corporation.

Pittsburgh and Valley steel works, unable to buy pig iron to make up shortages, are using more scrap, but even so the steel-ingot output is only 75 to 80 per cent of capacity, and the ingot output for the year is now estimated at 42,600,000 tons, as against 41,400,000 tons last year.

Hundreds of thousands of tons of steel for Europe are held up at Atlantic ports and elsewhere by freight congestion. For Italy alone, 82,000 tons is awaiting steamers at one port.

In wire products, sales are being made to the manufacturing trade for delivery in the first quarter of the new year, and considerable foreign demand is still coming up. One 27,000-keg contract for nails is being placed by a single Eastern shipyard for new buildings.

Government orders for tin plate since September have run up to 400,000 to 500,000 boxes, of which about half is for the Allied governments. Practically all the tin-plate output of the first half of 1918 is now under contract.

Upper Lake shipping ports have sent down their last iron-ore cargoes, and the Lake movement for the season is now estimated at 62,300,000 to 62,400,000 tons, December yielding rather a smaller total than seemed probable after the extraordinary performance in November.

The problem of scrap prices is still a serious one, but the Steel Committee has not yet acted on the proposal to establish maximum prices for all old material by groups. Railroads, to get maximum prices for their scrap, would have to sell to iron and steel companies. That would eliminate the scrap dealer, unless some scheme of commissions could be worked out.

The steel industry would be hard hit by any sweeping order affecting Austro-Hungarian subjects, and that is probably a guarantee that the order will not be sweeping. Steel companies have made earnest representations on this subject to Washington, and it is probable that manufacturers must plan for a closer oversight of working forces in which Austrians predominate.

Pittsburgh

PITTSBURGH, Dec. 11.—(By Wire).

The general operating committee of the Eastern railroads, which has its headquarters in the Frick Arcade Building in this city, has made up a program of how it intends to clear up the congested railroad situation, as follows: Arrange for organization of the work of the committee and for co-ordination with other bodies where necessary to secure progress; utilize existing railroad facilities to fullest extent for war purposes; expand railroad facilities where necessary for war purposes; obtain full information as to essentials for war

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 12, 1917.	Dec. 5, 1917.	Nov. 14, 1917.	Dec. 13, 1916.
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$29.50
No. 2, Valley furnace...	33.00	33.00	33.00	31.00
No. 2, Southern, Cin'ti...	35.90	35.90	35.90	25.90
No. 2, Birmingham, Ala.	33.00	33.00	33.00	23.00
No. 2, furnace, Chicago*	33.00	33.00	33.00	30.00
Basic, del'd, eastern Pa.	33.75	33.75	33.75	30.00
Basic, Valley furnace...	33.00	33.00	33.00	30.00
Bessemer, Pittsburgh...	37.25	37.25	37.25	35.95
Malleable Bess., Ch'go*	33.50	33.50	33.50	30.00
Gray forge, Pittsburgh...	32.75	32.75	32.75	29.95
L. S. charcoal, Chicago...	37.50	37.50	37.50	31.75

Rails, Billets, etc., Per Gross Ton:	Dec. 12, 1917.	Dec. 5, 1917.	Nov. 14, 1917.	Dec. 13, 1916.
Best rails, heavy, at mill	....	....	....	\$38.00
O-h rails, heavy, at mill	....	....	....	40.00
Best billets, Pittsburgh...	\$47.50	\$47.50	\$47.50	55.00
O-h billets, Pittsburgh...	47.50	47.50	47.50	55.00
O-h sheet bars, P'gh...	51.00	51.00	51.00	55.00
Forging billets, base, P'gh	60.00	60.00	60.00	80.00
O-h billets, Phila.	47.50	47.50	....	60.00
Wire rods, Pittsburgh...	57.00	57.00	57.00	70.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.685	3.685	3.685	3.159
Iron bars, Pittsburgh...	3.50	3.50	3.50	3.25
Iron bars, Chicago.....	3.50	3.50	4.50	2.75
Steel bars, Pittsburgh...	2.90	2.90	2.90	3.00
Steel bars, New York...	3.095	3.095	3.095	3.169
Tank plates, Pittsburgh...	3.25	3.25	3.25	4.25
Tank plates, New York...	3.445	3.445	....	4.419
Beams, etc., Pittsburgh...	3.00	3.00	3.00	3.25
Beams, etc., New York...	3.195	3.195	3.195	3.419
Skelp, grooved steel, P'gh	2.90	2.90	2.90	2.85
Skelp, sheared steel, P'gh	3.25	3.25	3.25	3.00
Steel hoops, Pittsburgh...	3.50	3.50	3.50	3.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	4.25
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	6.00
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.00
Cut nails, Pittsburgh...	4.50	4.50	....	2.95
Fence wire, base, P'gh...	3.25	3.25	3.25	2.95
Barb wire, galv., P'gh...	4.35	4.35	4.35	3.85

Old Material, Per Gross Ton:	Dec. 12, 1917.	Dec. 5, 1917.	Nov. 14, 1917.	Dec. 13, 1916.
Iron rails, Chicago.....	\$37.00	\$37.00	\$35.00	\$29.00
Iron rails, Philadelphia...	38.00	38.00	38.00	27.00
Carwheels, Chicago.....	34.00	30.00	27.75	22.00
Carwheels, Philadelphia...	34.00	34.00	29.00	22.50
Heavy steel scrap, P'gh...	30.00	30.00	29.00	27.00
Heavy steel scrap, Phila.	28.00	27.00	26.00	24.00
Heavy steel scrap, Ch'go.	28.00	28.00	28.00	23.50
No. 1 cast, Pittsburgh...	29.00	28.00	26.00	23.00
No. 1 cast, Philadelphia	31.00	31.00	30.00	21.00
No. 1 cast, Ch'go (net ton)	23.50	23.50	22.50	16.50
No. 1 RR. wrot. Phila...	35.00	35.00	35.00	27.00
No. 1 RR. wrot. Ch'go (net)	31.25	31.25	31.00	26.00

Coke, Connellsville, Per Net Ton at Oven:	Dec. 12, 1917.	Dec. 5, 1917.	Nov. 14, 1917.	Dec. 13, 1916.
Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$7.50
Furnace coke, future....	6.00	6.00	6.00	4.00
Foundry coke, prompt...	7.00	7.00	7.00	8.00
Foundry coke, future....	7.00	7.00	7.00	6.00

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	23.50	23.50	23.50	35.50
Electrolytic copper, N. Y.	23.50	23.50	23.50	35.50
Spelter, St. Louis.....	7.50	7.75	7.75	11.50
Spelter, New York.....	7.75	8.00	8.00	11.75
Lead, St. Louis.....	6.37½	6.37½	6.37½	7.80
Lead, New York.....	6.50	6.50	6.50	7.90
Tin, New York.....	86.00	80.00	73.00	43.00
Antimony (As'atic), N. Y.	15.25	15.25	13.75	14.00
Tin plate, 100-lb. box, P'gh	\$7.75	\$7.75	\$7.75	\$6.50

purposes, quantity, origin, destination and relative importance; obtain full information as to available vessel tonnage, present and prospective, for United States Government and Allies, separately; obtain an adequate supply of efficient labor. The subjects are listed in the order of their importance, based on what the committee can accomplish promptly by its own independent action. Their true importance, from a military standpoint, is in the reverse order.

This general operating committee has arranged for a joint meeting with presidents of several of the leading steel companies, pig iron interests, coke producers and heads of other interests to be held in its offices here Friday morning, Dec. 14. The committee believes that by holding a joint conference with the heads of the various interests named that have full power to act, it will be able to make faster progress in its efforts to clear up the present congested railroad situation, much the worst ever known in the history of the railroads or in the steel business. Operating conditions among the blast furnaces and steel plants in the Pittsburgh, Youngstown and other districts are not any better than last week, and, if anything, are worse. It is probable that good progress would have been made this week by the general operating committee of the Eastern railroads in clearing up the congested railroad conditions, but on Saturday night, Dec. 8, a blizzard set in and there has been zero weather ever since. This naturally retarded more than ever the movement of cars and added to the troubles of the railroads, so that conditions to-day are probably worse than at any time. However, in the Youngstown district the railroad situation is said to be somewhat better and there has been a freer movement of coke to the blast furnaces than for some time. The two Ohio stacks of the Carnegie Steel Co. that were banked have again been started, the banked stack of the Youngstown Sheet & Tube Co. has been put in blast and also the Hubbard stack that was banked for lack of coke. The coal situation is not any better

and all the plants at Youngstown are running very short of fuel. A movement started here last week to establish a two weeks' shutdown of manufacturing plants in the Pittsburgh district, or from Dec. 22 to Jan. 7, has collapsed. A meeting of the committee on mining and manufacturing of the Chamber of Commerce was held here last week, but it was decided that the imperative demands of the Government for materials for war purposes were such that the proposed shutdown would be unwise and the matter was dropped. It is claimed, and it is probably true, that 75 to 80 per cent. of the output of Pittsburgh manufacturing plants is for war purposes on either direct or indirect Government orders. The amount of new business being placed for iron and steel products by other consumers is very light. The agitation started for a revision of Government steel prices on Jan. 1 to a lower basis has no doubt unsettled the trade and consumers are not buying a pound of material they can do without. In addition, this is stock-taking period, when all consumers buy as little material as possible. It is very difficult to find any mills that will sell anything at Government prices for delivery before Jan. 1, and consumers are indifferent about buying for delivery beyond that period until conditions are more settled. As yet no advices have been received here as to what action was taken at the conference in Washington, Monday and Tuesday, between the general committee on iron and steel and the War Industries Board. It is the general opinion that a revision of steel prices on Jan. 1 would be a detriment to the steel trade and make conditions even worse, as regards new buying, than they are now.

Pig Iron.—It is the old story in pig iron, every consumer trying to buy, and practically no pig iron to be had. There would be no trouble in selling promptly 100,000 tons or more of Bessemer or basic iron to consumers in this district, and it might be double that amount, but there is no iron being offered. Many open hearth steel plants, unable to get pig iron as fast as

needed, are changing their mixtures, and using more scrap. The output of pig iron in the last three or four days has been materially cut down by the cold weather, which has held up shipments of coke, and in addition on very cold mornings the number of men that report to work is cut down a good deal, and this interferes with operations. A fair amount of foundry iron is being sold for delivery in first quarter and first half of next year at the regular price of \$33 for No. 2. The Carnegie Steel Co. has at present 18 or 19 blast furnaces banked for lack of coke, but expects to start some of these this week.

We quote as follows: Basic pig iron, \$33; Bessemer, \$36.30; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable Bessemer, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—It is almost as difficult to find any surplus steel in billets or sheet bars for sale in the open market as it is to find pig iron. All the large steel mills are short of steel, due to scarcity of pig iron, and output has been cut down very considerably in the past three or four days on account of the blizzard. Some of the larger steel companies are selling very little open-hearth steel in the open-hearth market, desiring to conserve as much of their output as they possibly can for the Government. It is a fact that four or five of the larger open-hearth steel companies are selling 75 to 80 per cent of their entire output of steel to the Government and practically the same percentage of other products. The mills are taking care of customers on contracts for billets and sheet bars in pretty fair shape, but none of the mills is seeking new business, and, in fact, they would much prefer to buy steel if they could find it, than to sell it.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Ferroalloys.—The new demand for the different grades of ferroalloys is heavier than for some time, and prices are very firm, on some grades being slightly higher. We now quote 80 per cent domestic ferromanganese at \$250, delivered, and 18 to 22 per cent spiegel-eisen at \$62 to \$65, delivered. Prices on 50 per cent ferrosilicon are higher, and we now quote for prompt delivery \$165 to \$170, delivered. One leading maker of Bessemer ferrosilicon is reported sold up for first half of next year and for delivery in second half of next year is quoting 9 per cent at \$51.70 at furnace, while another maker that will accept orders for delivery in first quarter and first half of next year is quoting 9 per cent at \$54 at furnace.

We now quote 9 per cent Bessemer ferrosilicon at \$54.00, 10 per cent \$55, 11 per cent \$58.30, 12 per cent \$61.60. We quote 6 per cent silvery iron \$40, 7 per cent \$42, 8 per cent \$44.50, 9 per cent \$47, 10 per cent \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—The two leading local steel fabricators say that practically all the new business they are taking is for the Government either on direct or indirect orders, and no details regarding these contracts are given out. The amount of industrial structural work that is being placed by domestic customers, other than those working on war materials, is very light, due to high costs of steel and labor, and the long delay that will be experienced in having their orders filled, Government business taking priority over all other contracts. We quote beams and channels up to 15 in. at 3c. at mill, but none of the structural steel mills has any material to sell for delivery before the middle of next year or later.

Steel Rails.—The amount of new business being placed in light rails and standard sections is very light. The mills rolling light rails from billets, and also the rerolling light rail mills are filled up for some months.

We quote light rails, 25-lb. and heavier, at 3c. per lb.; 16-lb. and 20-lb., 3.45c.; 12-lb. and 14-lb., 3.90c., and 8-lb. and 10-lb., at 4.35c. for full carload lots, f.o.b. Pittsburgh; for less than carload lots, down to and including five gross tons, 0.045c. extra, and small lots under five gross tons, 0.09c. extra, all per lb., f.o.b. Pittsburgh.

Plates.—The supply of plates available in the open market for early delivery at the Government price seems to be growing less, due no doubt to the fact that

Government demands for plates are getting steadily heavier. One Youngstown mill, that formerly sold a fair amount of plates in the open market, has retired as a seller, its entire output now going to the Government with the exception that a small part of it is used in its pipe mills. No new orders for steel cars are being placed in this district, and the steel car companies report that deliveries of plates by the mills are not any better and are only 40 to 50 per cent of normal requirements. About 75 to 80 per cent of the output of plates of the two leading mills in this district is going to the Government. We quote ¼ in. and heavier sheared plates at 3.25c. at mill, f.o.b. Pittsburgh.

Sheets.—Most of the mills have covered the needs of their larger customers for the first half of 1918 in sheets, except on galvanized, which so far are being sold only for first quarter. As noted last week, the new demand for sheets from the automobile trade has fallen off very much, and this will allow a considerable tonnage of sheets that otherwise would have gone to the builders of pleasure cars to be diverted to the manufacture of other products. Some consumers of sheets are not showing much eagerness to cover ahead, not knowing whether they will be able to operate their plants in the near future, as they are not making materials regarded as essential to the conduct of the war. It is said that as high as 10c. per lb. has recently been paid in this market for sheets rolled from puddled iron. Prices in effect on all grades of sheets are given in detail on page 1447.

Tin Plate.—Fairly heavy Government orders for tin plate are still being placed. One order for 40,000 boxes came out last week, mostly for shipment to France and Belgium. It is estimated that in the past two or three months the Government has bought a total of 400,000 to 500,000 base boxes of tin plate, probably half of which was for shipment to our Allies. There are still some export orders in the market, and a recent Government decision is that contracts made prior to Government rulings are exempt from these rulings and licenses are issued for such contracts. A recent Government ruling is that all inquiries for overseas shipment must be submitted to the War Board before manufacturers are allowed to quote. All the tin plate that will be made in the first half of 1918 is practically under contract, but a few consumers have not yet covered. Some mills covered their trade for all of next year, the price for the second half of the year to be fixed later. More tin plate is now being made from Bessemer stock than for a long time, the Government requirements for open hearth steel being so heavy that the steel mills are diverting every pound of open hearth steel possible to Government work and using Bessemer for making tin plate and other products, for which it is just as suitable as open hearth steel. Some tin plate mills are using all Bessemer steel, being unable to get open hearth bars from their regular sources of supply. The current demand for small lots is fairly active, and stock items are moving out freely. We quote coke plate at \$7.75 per base box, f.o.b. Pittsburgh, for Bessemer and open hearth stock, and our prices onterne plate are given on page 1447.

Iron and Steel Bars.—Consumers of iron and steel bars are not able to find any mills that will take their orders for prompt shipment at the regular ruling prices, the mills stating their obligations are such that their entire output is sold up for some months. The new demand for both iron and steel bars is not very active, and from some consumers, notably wagon builders and implement concerns, is quiet. The demand for reinforcing rods for building purposes is also dull. Specifications against contracts are fairly active. We quote steel bars at 2.90c., and refined iron bars at 3.50c. in carloads, f.o.b. Pittsburgh.

Wire Rods.—The domestic demand is quite active, and there is also considerable foreign inquiry. One inquiry from Canada for 1000 tons of soft rods came out last week. No differentials were fixed by the Government for high carbon rods, and the mills are quoting on these, whatever prices they see fit. One

leading producer is charging a differential of about \$10 per ton for high carbon rods over ordinary rods, and another maker is asking close to \$20 advance. Local makers of rods report they are pretty well sold up for the next few months, but can take some business for delivery late in the first quarter. There is a growing scarcity in the supply of open hearth rods, due to the fact that the Government is taking so much open hearth steel for war purposes. Prices on rods are given in detail on page 1447.

Wire Products.—The Government is still a fairly heavy buyer of wire and wire nails on direct and indirect orders, one order coming out last week from the International Shipbuilding Corporation for 12,000 to 13,000 kegs of wire nails for prompt shipment. There is also a fair amount of foreign demand for both wire and wire nails, but it is very difficult to get cars and even harder to get Government licenses for export shipment. Makers of wire nails are watching closely the conference of the steel manufacturers and the War Industries Board at Washington, and still believe that there should be at least a slight advance in prices on all wire products. The demand for wire and wire nails is fairly active, and stocks are said to be lighter than usual. A good deal of steel, particularly open hearth that was formerly used in the manufacture of wire and wire nails, is now going into Government material, and some makers of wire products are cutting down their output very considerably for this reason. Prices on wire and wire nails being quoted by the mills are given in detail on page 1447.

Nuts and Bolts.—Makers report that only a small amount of new civil business is being placed, fully 80 to 90 per cent of new orders coming from the Government or from concerns doing Government work. Deliveries of steel by the mills are reported better than for some time, and the output of nuts and bolts is running very close to capacity. Specifications against contracts are fairly active, and the regular Government discounts are given on page 1447.

Rivets.—General buying is very light, but the Government is placing heavy direct and indirect orders for rivets, which the makers are turning out and shipping promptly. It is said that fully 90 per cent of the new business in rivets is coming from the Government. We quote structural rivets at \$4.65, and cone head boiler rivets at \$4.75 base, in carloads, f.o.b. Pittsburgh.

Hoops and Bands.—It is not likely that any mills rolling hoops and bands are able to take new orders for shipment within three to four months or longer. The leading maker of hoops and bands is sold up for at least the first half of 1918, and has heavy obligations for second half of next year. The Government price on steel bands is 2.90c. and extras as per the steel bar card, and 3.50c. on steel hoops f.o.b. Pittsburgh.

Shafting.—New buying from the general trade is very dull, but the Government is placing heavy direct and indirect orders, and it is estimated that fully 90 per cent of the new business in shafting is for such work. There has been a heavy falling off in orders from the automobile and screw stock machine trade for shafting, and specifications on contracts are quiet. The Government is using very large quantities of shafting for adaptors and large quantities are also being used by the nut and bolt people, and also in the manufacture of small turnbuckles for airplanes. We quote cold rolled shafting in large and small lots at 17 per cent off list, f.o.b. Pittsburgh.

Cold Rolled Strip Steel.—The non-Government trade is dull, and many fairly heavy users of cold rolled strip steel are holding back placing orders, not knowing whether they will be able to operate their plants steadily, particularly those concerns making products not regarded as essential to carrying on the war. It is also true that there is no incentive for consumers to make contracts and makers are discouraging this as much as they can. Most of the new business being placed is on Government direct or indirect orders. The demand from the automobile trade and other trades has fallen off very materially, and all makers of cold rolled strip steel are in position to take orders for fairly prompt shipments. It is not expected that prices on cold

rolled strip steel will be changed, as they are regarded as fair by both makers and consumers.

We quote cold rolled strip steel at \$6.50 and hot rolled at \$4.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent off for cash in 10 days, when sold in quantities of 300 lb. or more.

Hot Rolled Strip Steel.—Makers report the new demand quiet, but state the Government price is very firm, and no material is being sold at a lower figure. We quote hot rolled strip steel at \$4.50 per 100 lb. f.o.b. Pittsburgh.

Railroad Spikes.—The new demand is dull, but jobbers are buying freely; in fact, most of the new business for some time has come from this source. Railroads have not been in the market actively for spikes.

We quote standard sizes of railroad spikes at 4.50c. 1/2-in. railroad spikes, 5.50c. base; 3/4-in. and 7/16-in., 6c. base; 5/16-in., 7c. base, per lb., f.o.b. Pittsburgh.

Wrought Pipe.—The Philadelphia Co.'s annual inquiry came out last week and was closed for about 20,000 tons of tubular material, consisting of line pipe, casing, tubing and plain-end pipe. The company will buy either iron or steel, but it is doubtful whether it will be able to get very much of this material in iron. The new demand for iron and steel pipe from the domestic trade is quiet, but the Government is still placing fair sized orders right along, which the mills get out and ship very promptly. Some of the larger mills rolling steel pipe are filled up for practically all of next year on lapweld sizes, but on butt weld pipe can take orders for fairly prompt shipment. The demand for butt weld pipe is dull, especially for sizes used for building purposes. Discounts on iron and steel pipe are given on page 1447.

Boiler Tubes.—Practically the entire output of the leading maker on seamless tubing and boiler tubes is going to the Government, and other makers are also filling large Government orders. On boiler tubes, most of the mills are not in position to take orders for delivery before second half of next year. Now that the shipbuilding program of the Government is under way, the demand on the mills for boiler tubes will likely become more urgent. It is said that every mill making iron or steel tubing is sold up for some time. These discounts are given on page 1447.

Coke.—Operating conditions in the coke trade are very unsatisfactory. The supply of cars is bad, labor is scarce, and the cold snaps of the last three or four days cut down output very much just at the time when it was needed most. Monday and Tuesday of this week the Pennsylvania Railroad Co. furnished almost no cars, the B. & O. about 30 per cent, and the P. & L. E. possibly about 50 per cent. During the very cold weather, many coke workers at beehive ovens failed to report for duty, and the output of coke was cut more than 50 per cent. A committee of brokers in coke is in Washington to-day (Tuesday) conferring with the Fuel Administrator, trying to get authority to charge a commission of 50 cents a ton, or at least 25 cents for handling coke. It is not believed, however, that the Government will grant this. It is said by several large coke operators that the scheme proposed by the railroads for pooling coke shipments is not feasible. There are too many grades of coke, and too many other conditions entering into this problem. Practically every coke plant makes a certain grade of coke, different from the others, and it is pointed out that a 500-ton blast furnace can use say 75 per cent of high grade coke, and then work in 25 per cent of a lower grade. The car supply is expected to be better the latter part of this week, as the cold weather is moderating. No contracts for furnace and foundry coke are being made, but on Jan. 1 a number of contracts for high grade blast furnace coke made prior to the time the Government fixed the price of \$6 on furnace coke will go into effect. These contracts were made with four or five of the large steel companies, and call for blast furnace coke at prices ranging from \$8 to \$9 per net ton, and it is said one large contract was made at \$9.50 per net ton. It is claimed that all coke producers are now adhering firmly to Government prices on all their sales. We quote furnace coke at \$6, foundry \$7, and crushed coke from

1-in. size \$7.30, all in net tons at oven. The output of coke in the upper and lower Connellsville regions for the week ending Dec. 1 is given by the *Connellsville Courier* as 295,316 tons, a decrease over the previous week of 20,702 tons. This is the smallest output in one week for some time, and it is not unlikely that the output for the week ending Dec. 8 will be still less.

Old Material.—Dealers report that railroad conditions are steadily getting worse, and are so bad that they are indifferent about doing business. Conditions are such that it is almost impossible to get cars, and when a car of material is rejected, the dealer often suffers a severe loss in trying to have it moved to some other consumer. Conditions in the scrap trade as regards prices are also very unsatisfactory to dealers. They claim they cannot buy material at Government prices and handle it with a profit. In some cases, it is known that consumers, in order to get heavy steel scrap and other old material they badly need, are paying a commission to dealers to get it, this allowing the dealers a profit. A largely attended meeting of scrap dealers was held in the Woolworth Building, New York, last week to consider the present unsatisfactory conditions existing in the scrap trade, but up to this time it is not known whether any definite plan was worked out. The scarcity of pig iron is helping the scrap market a good deal, and prices on nearly all grades are higher. There have been sales in the past week of heavy steel scrap at the full Government price of \$30, and also of borings and turnings at the Government price of \$20, delivered. The entire market this week on all grades of scrap, not controlled by Government prices, is from \$1 to \$2 per ton, higher. Dealers quote for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$30.00
No. 1 foundry cast	\$29.00 to 30.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa., and Pittsburgh	38.00 to 39.00
Hydraulic compressed sheet scrap	26.00 to 27.00
Bundled sheet scrap, sides and ends, f.o.b. consumer's mill, Pittsburgh district	24.00 to 25.00
Bundled sheet stamping scrap	21.00 to 22.00
No. 1 railroad malleable stock	37.00 to 38.00
Railroad grate bars	19.00 to 20.00
Low phosphorus melting stock	38.00 to 40.00
Iron car axles	42.00 to 43.00
Steel car axles	43.00 to 44.00
Locomotive axles, steel	51.00 to 52.00
No. 1 busheling scrap	19.00 to 20.00
Machine shop turnings	19.00 to 20.00
Cast-iron wheels	33.00 to 34.00
Rolled steel wheels	36.00 to 37.00
*Sheet bar crop ends	37.00 to 38.00
Cast-iron borings	19.00 to 20.00
No. 1 railroad wrought scrap	37.00 to 38.00
Heavy steel axle turnings	25.00 to 26.00
Heavy breakable cast scrap	26.00 to 27.00

*Shipping point.

Philadelphia

PHILADELPHIA, Dec. 11.

There is some anxiety among iron and steel producers that the Government may seek to bring about a revision of the prices which are in effect until Jan. 1. It is generally conceded that any change, either upward or downward, would be disturbing, and it is understood that representatives of the Eastern Pennsylvania steel industry who attended the meeting in Washington Monday advocated a continuation of the present schedules after the first of the year. The feature of trading in this market continues to be the large demand for pig iron, and it is estimated that upward of 60,000 tons were sold during the past week. A large part of this was basic iron for delivery during the first half of the year. The pig iron trade is rapidly working toward a condition where it is going to be almost impossible for any but concerns engaged on war work to obtain iron. A slight improvement is noted in the coke supply and fewer blast furnaces are banked. Railroad congestion, however, is serious.

Pig Iron.—Another buying flurry in this market during the past week resulted in the booking of orders for about 60,000 tons of iron, of which more than 30,000 tons was basic iron for delivery over the first half of

next year. One lot of 5000 tons was sold for January-February delivery to an eastern Pennsylvania structural mill. Steel companies have by no means satisfied their requirements. The American Bridge Co. wants more basic for its Pencoyd works at Trenton, N. J., and the American Steel & Wire Co. wants basic for its Worcester, Mass., plant. It is probable that this iron will be brought from Southern furnaces. There is also a large demand for low phosphorus iron, and about 12,000 tons of the copper free was sold for delivery in the second half. There is practically none to be had for first half. Two lots of copper bearing low phosphorus iron were taken by an eastern Pennsylvania company, 3000 tons for prompt delivery and 7500 tons for delivery next year. A radiator company has had difficulty in placing orders for 12,000 tons of foundry iron for delivery over next year because of its inability to show that all of the iron is to be used on Government work. The demand for foundry iron is so insistent that purchasers are willing to waive analysis and take any grade they can obtain. There have been requests for prompt delivery foundry iron, which could not be satisfied. For next year a fairly large number of orders is being placed. The question of priority is as disturbing to sellers as it is to buyers. Several sellers have written to their customers, asking them to state the character and quantity of war work in which they are engaged, and the answers reveal the fact that practically every company is working to some extent on direct or indirect Government business. Inasmuch as there will probably not be enough iron next year to satisfy all requirements, some must go without or their supply will be materially reduced. The Government authorities show a disposition to permit the pig iron makers to take care of demands with as little disturbance to contracts as possible, but sellers of iron maintain that they cannot be placed in the position of choosing which of their customers shall receive iron. Some contracts are being placed with the understanding that the iron will be shipped provided that the output of the furnace is up to expectations and that the Government does not disturb deliveries by commandeering. Consumers who are not getting enough iron are sending their complaints to Washington, with the result that the Government authorities are requesting the makers to increase their deliveries. This cannot be done in some instances without taking iron away from some other consumer who probably needs it as badly as the consumer who makes the complaint. It is becoming more apparent that the Government will eventually be obliged to commandeer iron to provide its war contractors with a sufficient supply, and when this process begins deliveries on existing contracts will, of course, suffer considerable delay. A case in point is the inquiry of the Tacony Ordnance Corporation, Tacony, Pa., for 5700 tons of low phosphorus iron for delivery from February to June. This company is building a plant for the Government for making gun forgings, and its requirements must, of course, be met, but as the low phosphorus iron output is well sold up for the first half, it is not unlikely that a commandeering order will be necessary to procure it. We quote standard grades of iron at furnace as follows, to which should be added the freight rate to destination:

Eastern Pennsylvania No. 1 X	\$34.50
Eastern Pennsylvania No. 2 X	33.50
Eastern Pennsylvania No. 2 foundry	33.00
Virginia No. 2 X	33.50
Virginia No. 2 foundry	33.00
Basic	33.00
Gray forge	32.00
Bessemer	36.30
Standard low phosphorus	54.00
Low phosphorus (copper bearing)	50.00

Coke.—Deliveries of coke are slightly better and blast furnace operators have hope that there will be a continued improvement. Fewer blast furnaces are banked. There has been a more successful handling of priority shipments. We quote blast furnace coke at \$6.00, and 72 hr. foundry coke at \$7.00, with none being sold here for prompt delivery.

Ferroalloys.—The market for ferromanganese is firmer and quotations now range from \$240 to \$250, whereas a week ago there were numerous sales around \$235. Two ferromanganese blast furnaces are banked

and this has had some effect upon the situation. Some of the vessels carrying ore from Brazil have been taken over by the Government. The Tacony Ordnance Corporation wants 250 tons of ferromanganese for delivery beginning in February; also 25 tons of ferrosilicon and 25 tons of spiegeleisen. A great scarcity of ferrochrome has developed, due to scarcity of ships for bringing the chrome ore from New Caledonia and South Africa. In sympathy with ferromanganese, spiegeleisen shows a firmer tone, the minimum now being quoted as \$60 at furnace.

Billets.—There is nothing being done in this market in billets, producers requiring all that they make for their own finishing mills. The market is nominal at the Government price of \$47.50, Pittsburgh, for rerolling billets.

Sheets.—A fair amount of business is being done for first quarter delivery. The Pennsylvania Railroad Co. has placed a large order for new freight cars now building at its shops. We quote No. 10 blue annealed at 4.25c., Pittsburgh; No. 28 black at 5c., and No. 28 galvanized at 6.25c.

Structural Material.—Except for Government buildings, the demand for structural material is nil. A structural steel company which has made a canvass of building projects which have been reported during the past few months has found that all of these have been shelved pending a more favorable situation. We quote shapes at 3c., Pittsburgh.

Plates.—The American International Shipbuilding Corporation is now giving out orders for the fabrication of plates and shapes into sections for the 70 troopships which it will build at Hog Island. These ships will require about 200,000 tons of finished material. A new plate mill is soon to be built in eastern Pennsylvania. Details will be announced later. Shipments of plates continue to be almost entirely for Government work. It is reported that some of the new shipyards have hundreds of tons of plates on the ground with no machinery shipped as yet for doing the fabricating work. We quote plates at 3.25c., Pittsburgh.

Iron and Steel Bars.—Very little is being done in steel bars, most of the mills declining to consider new business. A few are taking care of their regular customers for first quarter, but the allotments, in some instances, will fall short of consumers' requirements. Bar iron mills are taking business largely for shipment at their own convenience. This sometimes means fairly prompt deliveries if rollings of the required sizes are being made. We quote steel bars at 2.90c., Pittsburgh, and bar iron at 3.50c., f.o.b. mill or Pittsburgh.

Old Material.—There is a disposition on the part of many small dealers to refuse to sell at the prices which are now being offered for delivery in eastern Pennsylvania. Heavy melting steel was sold last week for delivery at Coatesville, Pa., at \$28 per ton. No. 1 railroad wrought is scarce at the fixed price of \$35 and No. 1 yard wrought is being substituted in a great many cases, dealers now obtaining \$33 to \$35 for the latter grade. No. 1 forge fire and bundled sheets are also higher. We quote as follows for delivery in eastern Pennsylvania:

No. 1 heavy melting steel.....	\$28.00 to \$29.00
Steel rails, rerolling	38.00 to 40.00
Low phosphorus heavy melting.....	36.00 to 38.00
Old iron rails.....	38.00 to 40.00
Old carwheels	34.00 to 36.00
No. 1 railroad wrought.....	35.00
No. 1 yard wrought.....	33.00 to 35.00
No. 1 forge fire.....	23.00 to 24.00
Bundled sheets	23.00 to 24.00
No. 2 busheling	15.50 to 16.50
Steel turnings (for blast furnace use)	15.50 to 16.00
Machine shop turnings (for rolling mill use)	18.00 to 19.00
Cast borings (for blast furnace use)	15.50 to 16.00
Cast borings (clean).....	20.00
No. 1 cast	31.00 to 33.00
Grate bars	21.50 to 22.50
Stove plate	22.00 to 23.00
Railroad malleable	30.00 to 32.00
Wrought iron and soft steel pipes and tubes (new specifications)	30.00 to 32.50

Buffalo

BUFFALO, Dec. 10.

Pig Iron.—The market situation is summed up in the statement that while inquiries are numerous and insistent, furnaces are obliged to disregard them in a large measure, because of their inability to accept more than very limited additional business under present disabilities in the way of coke and labor shortage and other uncertainties and cannot in consequence quote definitely on future commitments, or promise deliveries. This week the situation is made worse by severe weather conditions, deep snows and high winds, which have clogged railroad yards, disrupted railroad traffic and brought freight movement almost to a standstill. One producer reports two inquiries of 10,000 tons each for basic on which it was obliged to decline to quote. Some furnaces are not selling anything, even for last half, owing to sold up conditions for first half and uncertainties regarding supplies of raw materials later on. One selling interest states that its inquiries, which are of considerable volume, would be larger were it not for the fact that its regular buyers and others know that it is sold to the limit and is out of the market. In foundry coke, the situation is a little easier and heavy buying of foundry coke orders is reported. We continue to quote as follows, f.o.b. furnace, Buffalo:

No. 1 foundry	\$34.50
No. 2 X.....	33.50
No. 3 foundry.....	32.50
Gray forge.....	32.00
Malleable	33.50
Basic.....	33.00
Lake Superior charcoal, f.o.b. Buffalo.....	39.75

Old Material.—The market continues to show great strength, and the demand for heavy melting steel, particularly, is very heavy. The shortage in this commodity is becoming exceedingly pronounced, only small tonnages now being obtainable, and many yards of dealers are entirely depleted of this class of stock on account of the pressing demand. Stocks of many other grades are also becoming much contracted, as railroad scrap lists are light; rolling stock being operated as long as possible without renewals, and making scrapped materials of much smaller volume than usual. Dealers have been notified this week of embargoes placed on some additional consuming points, and owing to the increasing difficulties in shipping caused by embargoes and by tied up conditions in freight movement in this vicinity this week resulting from severe weather and heavy snows, the transaction of business has been seriously hampered; in fact, some dealers are not attempting to do any business on account of these conditions. There has been no change in the prices of any commodities on the list this week, and we continue to quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$29.00 to \$30.00
Low phosphorus	40.00 to 42.00
No. 1 railroad wrought.....	34.00 to 35.00
No. 1 railroad and machinery cast.....	30.00 to 31.00
Iron axles	45.00
Steel axles	45.00
Carwheels	32.00 to 33.00
Railroad malleable	29.00 to 30.00
Machine shop turnings.....	18.00 to 18.50
Heavy axle turnings.....	26.00 to 27.00
Clean cast borings.....	19.00 to 20.00
Iron rails	37.00 to 38.00
Locomotive grate bars.....	20.00 to 21.00
Stove plate	21.00 to 22.00
Wrought pipe	26.00 to 27.00
No. 1 busheling scrap.....	26.00 to 27.00
No. 2 busheling scrap.....	17.00 to 18.00
Bundled sheet stamping scrap	19.00 to 20.00

Finished Iron and Steel.—Practically all lines of finished materials show good demand. Considerable interest is being expressed by iron and steel users as to the results of the meeting scheduled to take place at Washington looking to the fixing of steel commodity prices for the first part of 1918. There is a feeling on the part of some selling agencies that prices on at least some of the commodities will be higher than the present schedule, due to increased costs. One local maker of billets reports that it is out of the market for one year, the United States Government and some of the allied Governments having taken

all of its product for that period of time, and a maker of wire rods states that it is contracted ahead for its entire production for between six and seven months.

Cincinnati

CINCINNATI, Dec. 11.—(By Wire.)

Pig Iron.—Latest reports show that there has been no general shutdown of furnaces in either the Hanging Rock district or in the South due to the shortage of coke on account of the severe weather of the past few days. However, one Jackson County, Ohio, furnace producing silvery iron has been compelled to bank, thus adding to the scarcity of high silicon iron. Steel making irons are exceedingly scarce and one prominent firm is authority for the statement that if basic iron could be obtained, over 100,000 tons could be disposed of immediately. Malleable is needed by only comparatively few firms, but its scarcity is almost as marked as that for basic. The foundries are engaged now in trying to obtain sufficient shipments of coke to carry them through the year. This situation is more serious with the furnaces and iron production will doubtless be cut down more than usual on account of the holiday season that will last longer than usual, partly due to the independent attitude of laborers in different coal and pig iron producing districts. Inquiries for foundry iron are scarce. Shipments en route have been delayed indefinitely. Government requirements are receiving first attention, but even priority orders have not relieved the situation as far as basic iron is concerned. Based on freight rate of \$2.90, Birmingham, and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, prices as follows:

Southern coke, No. 2 foundry and 2 soft.....	\$35.90
Southern Ohio coke, No. 2.....	34.26
Basic, Northern	34.26

Coke.—The movement of all freight is in a snarl on account of the blizzard that struck the Central West the latter part of last week. Prompt deliveries of coke are of course out of the question. Iron furnaces in the Hanging Rock district were able to operate until to-day, but unless a further supply of coke is received shortly, some of them may be compelled to bank temporarily. Foundry coke consumers are also very anxious and are making every effort to obtain a future supply. They are also using sparingly what coke they have on hand. The transportation heads of different firms are deluged with requests from customers to locate cars already en route, but so far this week they have been very much handicapped.

Finished Material.—Business continued to drop off with the jobbers last week, but the blizzard Saturday has almost completely tied up all operations and only the most urgent out-of-town shipments are made. Shipments from the mills are also delayed with not much chance that the situation can be cleared up within the next few days. The jobbers have now added the full freight rate from Pittsburgh instead of quoting even figures as heretofore with the usual jobbers' differential added.

Old Material.—Business is at a complete standstill and scrap that was loaded on cars for shipment to the Pittsburgh district early last week is still somewhere en route. The following are dealers' prices f.o.b. cars, southern Ohio and Cincinnati.

Per Gross Ton	
Bundled sheet scrap	\$17.50 to \$18.00
Old iron rails.....	32.00 to 32.50
Relaying rails, 50 lb. and up.....	44.00 to 44.50
Rerolling steel rails.....	33.00 to 33.50
Heavy melting steel scrap.....	25.50 to 26.00
Steel rails for melting.....	24.50 to 25.00
Old carwheels	27.00 to 27.50
Per Net Ton	
No. 1 railroad wrought.....	\$29.00 to \$29.50
Cast borings	13.00 to 13.50
Steel turnings	13.00 to 13.50
Railroad cast	18.50 to 19.00
No. 1 machinery cast.....	25.00 to 25.50
Burnt scrap	14.00 to 14.50
Iron axles	40.00 to 40.50
Locomotive tires (smooth inside)....	33.50 to 34.00
Pipes and flues.....	15.50 to 16.00
Malleable cast	19.50 to 20.00
Railroad tank and sheet.....	14.50 to 15.00

Birmingham

BIRMINGHAM, ALA., Dec. 11.—(By Wire.)

Two furnaces of the Republic Iron & Steel Co., which were out because of coke shortage caused by fire which destroyed the washer at the Sayreton mines, are again in operation. The Sloss Sheffield Steel & Iron Co. has blown out a furnace at Sheffield for repairs, but has completed a new furnace at the same place and will start it. The end of the week iron market is the same as last week, with production off and small lot sales being made for delivery the first half of next year. Soil pipe plants are shutting down indefinitely. They have no business. There is a little apprehension owing to the report that the Government proposes a downward revision of prices Jan. 1.

British Steel Market

Pig Iron for Export Advanced—American Orders for Ferromanganese Held Up

(By Cable)

LONDON, ENG., Dec. 12.

Cleveland hematite pig iron for export to the Allies has been advanced to 147s. 6d. but for the home trade is unchanged at 122s. 6 d. American semi-finished steel is in poor demand. Wire rods for January & March shipment are quoted nominal at about £21 c.i.f. Ferromanganese is steady with American orders in abeyance. We quote as follows:

Tin plates coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 31s. 3d.
Ferromanganese \$270 c.i.f. nominal for export to America.
Ferrosilicon, 50 per cent. c.i.f. £35 upward.
On other products control prices are as quoted in THE IRON AGE of July 19, p. 171.

Revision of Maximum Pig-Iron Prices—Large Tin Plate Orders for France

(By Mail)

LONDON, ENGLAND, Nov. 20.—Further developments in regard to a revision of official prices are still in abeyance but an announcement may be made any day. The position is full of complexities, hence the delay which is causing considerable inconvenience. Various rumors have been afloat as to the outcome of the new conditions created by the recent rise in fuel, but nothing reliable is known as to the result of the conference on the adjustment in pig-iron prices. It is suggested that the authorities are disposed to grant a subsidy to smelters rather than interfere with the maxima in force, and producers seem to favor this. A readjustment of the whole position both of pig iron and finished material is imperative.

New business in Cleveland common foundry iron is small, applications for this month's deliveries having already been dealt with. Consumption is on a big scale, but deliveries are delayed by car shortage, and it is hoped that the arrears will be made up next month. For new orders makers' terms are subject to any official change enforced. General export business is quiet, although a fair tonnage has been arranged for Italy, both of Cleveland foundry iron and hematite. The latter shows no sign of becoming easier, but sufficient metal is available to keep home users' early requirements covered. The allocation of supplies is strictly controlled, and it is hoped that the prospect of an enlarged output over the year-end will materialize. There is a brisk demand for coke at the new maximum rates, the price for good medium furnace material being 35s. 6d. delivered at works.

The open market in semi-finished steel remains very bare, owing to the quantities requisitioned on Government account. The placing of orders for Welsh sheet bars and billets is extremely difficult, and American material remains lifeless, buyers being reluctant to avail themselves of the few offers of wire rods through merchants at around £26 c.i.f. Liverpool for near shipment.

Pending an official adjustment in raw material,

manufacturers are merely looking on, the negotiation of new orders in order to retain old customers being subject to any revision. Amid the prevailing unsettlement the pressure of working, however, is intense, the steel mills being faced with a big accumulation of Government work, while the calls made for shipbuilding are greater than ever. Ordinary mercantile work stands aside. The market in uncontrolled material rules strong, with a ceaseless active demand for mild steel bars, which are selling up to £19 delivered net for early delivery. Steel strip is dearer at £28 delivered net for early delivery. Steel hoops rule slow, but there is big inquiry for bar iron.

Very little American material is finding its way to this side, and this chiefly consists of second-hand lots for which freight is difficult to secure. Steel bars were recently sold at £35 c.i.f. for early shipment to India and at £24 f.o.b. New York.

The feature in tin plates has been the placing of further big orders for France direct with makers for November-December delivery, the total being about 150,000 boxes, and additional quantities are required for December-January. There is more activity in the home trade, and the works, being already well booked over the year-end, insist on the full maximum basis of 30s. net for cokes 20 by 14. Making allowance for the higher cost of tin in accordance with the regulations, to-day's quotation is 30s. 10½d., with business done thereat. For some time past makers' stocks in certain descriptions of wasters have accumulated owing to the restrictions imposed in regard to use outside of war work, but this is now being remedied by the issue of permits for various mercantile purposes for which facilities were heretofore withheld. It is likely that the ruling maximum basis may be raised shortly to cover higher costs.

The Ferromanganese Situation

There has been a further material drop in ferromanganese lately, which, however, has not been accompanied by any revival of business, and the market is very unsettled. The current c.i.f. quotation for American North Atlantic ports is now about \$275 for the next half year, at which a small order has been placed for Canada. American buyers held aloof lately, but seem again to operate. The demand from Allies and neutrals is again moderate, with small lots reported sold at about £60 for loose f.o.b. Conferences have been going on with the authorities regarding a revision of the home trade price of £25, which is considered far too low in view of the high costs, and as compared with export terms. It was rumored recently that the figure of £40 would be adopted, but no decision has yet been come to. Freightage as regards Indian manganese ores is extremely difficult and chiefly a matter of Government accommodation, while costs have risen very high.

New York

NEW YORK, Dec. 12.

Pig Iron.—If any progress has been made in the regulation of shipments by railroads it is not manifest in improved conditions. If there is any change it is for the worse on account of the extremely cold weather for the past two or three days. It is hoped, however, that unless heavy snows fall there will be improvements soon. The scarcity of all kinds of pig iron is pronounced, and it is very difficult to place orders for shipment prior to next July. Negotiations are still pending for the shipment of about 6000 tons of basic from Birmingham to the Pittsburgh district. In the case of foundries having Government work, special effort is being made by sellers to satisfy requirements. For early delivery we quote as follows:

No. 1 X.....	\$35.25
No. 2 X.....	34.25
No. 2 Plain.....	33.75
No. 2 Southern (rail and water).....	\$36.75 to 39.25
No. 2 Southern (all rail).....	39.15 to 39.65
No. 2 X Virginia.....	37.00 to 37.25

Ferrolloys.—The domestic ferromanganese market is quiet but firm at \$240 to \$245, delivered. Inquiry is

less than last week and sales have been fewer. A transaction involving 500 tons for delivery in the first half is reported at \$240, with smaller lots at the quotations noted. With production at a decidedly less rate in November than in October and with the October exports much in excess of the general estimate, the available supply has been materially lessened. There is some prediction of a scarcity in the coming months, especially if reports are true that manganese ore shipments from Brazil are being curtailed. Spiegeleisen is quiet at \$60 to \$65, furnace, for any delivery with sales of moderate amounts reported. Ferrosilicon, 50 per cent, continues strong at \$150 to \$175, depending on conditions and delivery.

Cast-Iron Pipe.—On 835 tons of cast-iron pipe, ranging in size from 4 in. to 24 in., bids were received Tuesday by Jersey City and were as follows: R. D. Wood & Co. (low bidder), \$46.95, net, all sizes; John Fox & Co., \$48.40, net, all sizes; United States Cast Iron Pipe & Foundry Co., all sizes except 4 in., \$56.15; 4 in., \$59.50; Warren Foundry & Machine Co., 24 in. and 20 in., \$48.49; 12 in., \$48.55; 6, 8 and 10 in., \$48.59; 4 in., \$53.25. A considerable tonnage of large pipe was involved and the business was considered attractive. Nominal quotations continue at \$56.50 for 6 in. and heavier, and \$59.50 for 4 in.

Old Material.—Active demand for heavy melting steel and some other grades continues and dealers are finding it extremely difficult to obtain permits to make deliveries. For this reason the volume of business transacted is not large. There is still some talk about prices being fixed by the Government, but no definite information is obtainable. If there is any change in the market it is in a slight improvement in the heavy steel situation in eastern Pennsylvania. We quote prices of brokers as follows to New York producers and dealers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania)....	\$25.00 to \$26.00
Old steel rails (short lengths) or equivalent heavy steel scrap.....	25.00 to 26.00
Relaying rails.....	55.00 to 60.00
Rerolling rails.....	35.00 to 36.00
Iron and steel car axles.....	41.00 to 42.00
No. 1 railroad wrought.....	32.00 to 33.00
Wrought-iron track scrap.....	28.00 to 30.00
No. 1 yard wrought long.....	28.00 to 30.00
Light iron.....	9.00 to 10.00
Cast borings (clean).....	16.50 to 17.50
Machine-shop turnings.....	15.00 to 16.00
Mixed borings and turnings.....	14.00 to 15.00
Wrought-iron pipe (1 in. minimum diameter), not under 2 ft. long....	27.00 to 28.00

Dealers in New York City and Brooklyn are quoting as follows to local foundries, per gross ton, but for delivery to cupola platforms of Brooklyn foundries about \$3 more is quoted:

No. 1 machinery cast.....	\$28.00 to \$29.00
No. 1 heavy cast (column, building materials, etc.).....	23.00 to 24.00
No. 2 cast (radiators, cast boilers, etc.).....	23.00 to 24.00
Stove plate.....	20.00 to 21.00
Locomotive grate bars.....	17.00 to 18.00
Malleable cast (railroad).....	27.00 to 28.00
Old carwheels.....	29.00 to 30.00

Finished Iron and Steel.—New business has been small in volume. The railroad chaos on top of the license difficulties has clearly discouraged export movements and the general uncertainty of the country, both in respect to the demands of the Government and the fixing of prices, has chilled interest for the moment on the part of domestic consumers. In spite of the overflowing condition of the United States Treasury, Government contracting goes on slowly, the result, it is believed, of the mushroom growth of departments and the difficulty thus of completing designs and expediting business. Betterment is not expected until uncertainties of prices and transportation are somewhat clarified. Makers of bolts and nuts are finding it possible to make much better deliveries than recently, owing to a reduced demand in the last few weeks, but how far this may be taken to indicate a general diminished demand in the last few months is difficult to state. One mill which resists making contracts has sold 2000 tons of steel bars on definite specifications, thus making the order one at the mill's convenience without specific statement as to the period which the order covers. A

maker of plates has emphasized that on any future sales it must be specifically indicated that deliveries are contingent on priority on account of Government needs and the sales are not subject to readjustment with any new schedule of prices. An inquiry for 2300 tons of universal plates, 10 to 24 in. in width, for France, is noted. Also 27,000 kegs of nails for the American International Shipbuilding Corporation. To hasten the closure of contracts for fabricated steel work, as for shipbuilding, the fabricating interests are planning to open an office in Washington. Meanwhile demand for fabricated steel work is dull, about the only fresh inquiry being 300 tons for the Southern Railroad. Contract awards include 650 tons for the brass foundry at the Washington Navy Yard and 300 tons for the Morse Dry Dock Co., Brooklyn, both awarded to the American Bridge Co.; and 950 tons for crane runways in Washington and 425 tons for buildings at Lake Denmark, both placed with the McClintic-Marshall Co. We quote mill shipments of steel bars at 3.095c., New York; shapes 3.195c., plates 3.445c. and bar iron 3.695c., New York. Out of store prices are 1c. higher and to all must be added 3 per cent of the freight charge for the transportation tax.

IRON AND INDUSTRIAL STOCKS

Market Unresponsive and Public Shows No Inclination to Buy or to Sell

The market last week reacted but briefly to both adverse and favorable influences. A drop in quotations, caused by President Wilson's reference in his message to Congress to further price fixing, was followed by a marked trend in the other direction, due to a generally favorable interpretation of the Interstate Commerce Commission's recommendation for unification of the railroads and to the statement by the Secretary of the Treasury that further taxation would be avoided if possible. Toward the end of the week transactions fell off steadily, and on Saturday less than 100,000 shares changed hands, the lowest aggregate sales for the short session in a long time. The public continues to stay out of the market.

Steel stocks showed a much sharper decline than in the preceding week. Of the active issues the only advances were Midvale Steel, com., $\frac{3}{4}$ and Superior Steel, com., $\frac{1}{2}$ point. Small sales of the preferred stocks of Crucible Steel, American Car & Foundry, and a few of the smaller companies were at slightly higher levels. U. S. Steel, com., declined $5\frac{1}{4}$ points and pref., 1 point; Bethlehem Steel, com., $5\frac{7}{8}$, class B, $5\frac{5}{8}$, and pref., $\frac{1}{2}$; Republic Iron & Steel, com., $2\frac{1}{4}$, pref., 1 $\frac{1}{2}$.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com. 16 - 18 $\frac{1}{2}$	Int. Har. of N. J. pf. 92 - 95
Allis-Chalm. pf. 70 - 72	Int. Har. Corp. pf. 93
Am. Can com. 32 - 34 $\frac{1}{2}$	Lacka. Steel. 77 $\frac{1}{2}$ - 80 $\frac{1}{2}$
Am. Can pf. 96 - 97 $\frac{1}{2}$	Lake Super. Corp. 11 - 11 $\frac{1}{2}$
Am. Car & Fdry. com. 63 $\frac{1}{2}$ - 67	Midvale Steel ... 40 $\frac{1}{2}$ - 43 $\frac{1}{2}$
Am. Car & Fdry. pf. 102 $\frac{1}{2}$	Nat. En. & Stm. com. 33 - 36 $\frac{1}{2}$
Am. Loco. com. 49 - 52 $\frac{1}{2}$	N. Y. Air Brake. 101 - 108
Am. Ship com. 90 - 91 $\frac{1}{2}$	Nova Scotia Steel. 63 - 65
Am. Steel Fdries. 53 $\frac{1}{2}$ - 55	Pitts. Steel pf. 89 $\frac{1}{2}$ - 89 $\frac{3}{4}$
Bald. Loco. com. 52 $\frac{1}{2}$ - 55 $\frac{1}{2}$	Press. Steel com. 50 - 51 $\frac{1}{2}$
Beth. Steel com. 7 $\frac{1}{2}$ - 76	Ry. Steel Spring com. 41 - 42
Beth. St., Class B. 72 $\frac{1}{2}$ - 75 $\frac{1}{2}$	Republic com. 72 $\frac{1}{2}$ - 76 $\frac{3}{4}$
Beth. Steel pf. 90	Republic pf. 94 - 94 $\frac{3}{4}$
Cent. Fdry. com. 30 - 30 $\frac{1}{2}$	Sloss com. 37 $\frac{1}{2}$ - 38
Cent. Fdry. pf. 41 $\frac{1}{2}$	Superior Steel ... 32 - 35 $\frac{1}{2}$
Chic. Pneu. Tool. 45	Un. Alloy Steel. 35 $\frac{1}{2}$ - 36
Colo. Fuel 32 - 33 $\frac{1}{4}$	U. S. Pipe com. 11 $\frac{1}{2}$
Cruc. Steel com. 50 - 54	U. S. Steel com. 85 - 90
Cruc. Steel pf. 88	U. S. Steel pf. 105 $\frac{1}{2}$ - 108 $\frac{3}{4}$
Deere & Co. pf. 95 - 95 $\frac{3}{4}$	Va. I. C. & Coke. 50
Gen. Electric 122 $\frac{1}{2}$ - 129 $\frac{1}{4}$	Warwick 8 $\frac{1}{2}$
Gt. No. Ore. Ct. 25 $\frac{1}{4}$ - 26 $\frac{1}{4}$	Westingh. Elec. 36 $\frac{1}{2}$ - 38 $\frac{1}{2}$
Gulf States Steel. 84 - 86	
Int. Har. of N. J. com. 108 - 110	

Dividends

The Allis-Chalmers Mfg. Co., quarterly, 1 $\frac{1}{4}$ per cent and extra $\frac{1}{4}$ per cent on account of accumulated dividends on the preferred, payable Jan. 15.

The American Car & Foundry Co., quarterly, 1 per cent

and extra 1 per cent on the common, and quarterly, 1 $\frac{1}{4}$ per cent on the preferred, payable Jan. 1.

The American Locomotive Co., quarterly, 1 $\frac{1}{4}$ per cent on the common, payable Jan. 3, and 1 $\frac{1}{4}$ per cent on the preferred, payable Jan. 21.

The American Steel Foundries, quarterly, 1 $\frac{1}{4}$ per cent, payable Dec. 31.

The General Fireproofing Co., quarterly, 1 $\frac{1}{4}$ per cent on the common and preferred, payable Jan. 1.

The Ingersoll-Rand Co., 3 per cent on the preferred, payable Jan. 1.

The Steel Co. of Canada, quarterly, 1 $\frac{1}{2}$ per cent on the common and 1 $\frac{1}{4}$ per cent on the preferred, payable Feb. 1.

The Yale & Towne Mfg. Co., quarterly, 2 $\frac{1}{2}$ per cent, payable Jan. 2.

Industrial Finances

The November record of business insolvency reported by R. G. Dun & Co. emphasizes the underlying strength of business, and commercial failures in the United States for the year to date disclose a numerical reduction of 19 per cent and a contraction of 6 per cent in the amount from the relatively light mortality of 1916. The November defaults, 981, are the smallest in number, excepting the 963 reverses of September, this year, of any month back to September, 1911, and fall below those of November of all years since 1909. Comparing with last year, there appears a decrease of 270, or more than 20 per cent, and from the high point for the period, 1815 insolvencies in November, 1914, there is a similar difference of 834 failures, or fully 45 per cent. Moreover, last month's liabilities of \$13,635,605, while larger than in October, September and May and April of this year, are less than in any November back to 1910, though the improvement over the figures of a year ago is only about \$500,000. But when comparison is made with November, 1914, a decline of nearly 50 per cent is shown.

The Wabash Valley Electric Co., Clinton, Ind., has issued \$150,000 preferred stock, making its total capitalization \$400,000.

The reduction of the capital stock of the Howard Shipyards & Dock Co., Jeffersonville, Ind., from \$800,000 to \$400,000 is said to be one of the steps in a reorganization of the company, with the purpose of obtaining backing to build oceangoing ships.

The Kentucky Solvay Coke Co., Ashland, Ky., has increased its capital stock from \$2,500,000 to \$5,000,000. No further improvements for the organization are contemplated other than those already mentioned. Eaton Rhodes & Co., First National Bank Building, Cincinnati, are sales agents for the company's product.

The rapid growth of the automobile tire industry the past year is indicated by the annual report of the Goodyear Tire & Rubber Co., Akron, Ohio. Its sales for the year ended Oct. 31 amounted to \$111,549,522, a gain of 74.37 per cent over the previous year.

A meeting of stockholders of the Liberty Steel Co. will be held at Warren, Ohio, on Friday, Dec. 14, to discuss the matter of increasing its capital stock. Edward F. Clarke is president, and the company contemplates making some additions to its plant now under way.

The East Ohio Gas Co. has filed a certificate with the secretary of state of Ohio, increasing its capital from \$20,000,000 to \$45,000,000.

A fourth and final dividend of 6 per cent, amounting to \$16,079 was declared and ordered paid to creditors of the Milwaukee Motor Co. at the final meeting to close up the affairs of the bankrupt estate. Total dividends paid amount to 41 per cent of proven claims of \$267,993. The company was adjudged bankrupt on June 30, 1913.

The Pennsylvania Railroad has increased the wages of employees at its machine and repair shops, Altoona, Pa., 10 per cent in the price paid for piece-work, effective December 1. The advance in certain classes of work will average as high as 20 per cent.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 35.5c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, 75c.; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is 90c.; minimum carload, 40,000 lb. and 85c.; minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha 40c., minimum carload 46,000 lb., to St. Paul 35.5c., minimum carload 46,000 lb.; Denver 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1-in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2, and shorter than 1-in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire, and fence staples \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets \$4.65 base
1 1/2 in. x 6 in. smaller and shorter rivets, 45-10 per cent off list
Machine bolts h.p. nuts, 1/2 in. x 4 in.
Smaller and shorter, rolled threads, 50-10-5 per cent off list
Cut threads 50-5 per cent off list
Larger and longer sizes, 40-10 per cent off list
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.
Smaller and shorter, 40-10 per cent off list
Larger and longer, 35-5 per cent off list
Carriage bolts, 1/2 in. x 5 in.
Smaller and shorter, rolled threads, 50-5 per cent off list
Cut threads 40-10-5 per cent off list
Larger and longer sizes, 40 per cent off list
Lag bolts 50-10 per cent off list
Flow bolts, Nos. 1, 2, 3, 50 per cent off list
Hot pressed nuts, sq. blank, 2.50c. per lb. off list
Hot pressed nuts, hex., blank, 2.30c. per lb. off list
Hot pressed nuts, sq., tapped, 2.30c. per lb. off list
Hot pressed nuts, hex., tapped, 2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank, 2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped, 2.00c. per lb. off list
Semi-finished hex. nuts,
1/2 in. and larger, 60-10-10 per cent off list
9/16 in. and smaller, 70.5 per cent off list
Stove bolts 70-10 per cent off list
Stove bolts 2 1/2 per cent extra for bulk
Tire bolts 50-10-5 per cent off list
The above discounts are from present lists now in effect.
All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. A tentative differential of \$10 per ton over soft rods for high carbon rods has been agreed upon.

Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. and larger, \$5 to \$5.50; 1/2 in., 7/16 in. and 1/4 in., \$7, base. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh. Track bolts with square nuts, 7c. to 7.50c. to railroads, and 8c. to 8.50c. in small lots for fairly prompt shipment.

Terne Plate

Effective Nov. 7, prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$16.75; 15-lb. coating, I. C., \$17.75; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. for delivery late this year, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/2, 3/4 and 1	44	17 1/2	1 1/4 and 1 1/2	23	+4
1 1/2	48	33 1/2	2	24	+3
3/4 to 3	51	37 1/2	2 1/2	28	10
			3 1/4 to 1 1/2	33	17
Lap Weld			Lap Weld		
2	44	31 1/2	1 1/4	18	3
2 1/2 to 6	47	34 1/2	1 1/2	25	11
7 to 12	44	30 1/2	2	26	12
13 and 14	34 1/2	..	2 1/2 to 6	28	15
15	32	..	7 to 12	25	12
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/2, 3/4 and 1	40	22 1/2	1 1/4, 1 1/2 and 3/4	22	5
1 1/2	45	32 1/2	2	27	14
3/4 to 1 1/2	49	36 1/2	3/4 to 1 1/2	33	18
2 to 3	50	37 1/2			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	42	30 1/2	1 1/4	19	4
2 1/2 to 4	45	33 1/2	1 1/2	25	11
4 1/2 to 6	44	32 1/2	2	27	14
7 to 8	40	26 1/2	2 1/2 to 4	29	17
9 to 12	35	21 1/2	4 1/2 to 6	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		Charcoal Iron	
3 1/2 to 4 1/2 in.	34	3 1/2 to 4 1/2 in.	12 1/2
2 1/2 to 3 1/2 in.	34	3 to 3 1/2 in.	+ 5
2 1/4 in.	17 1/2	2 1/2 to 2 3/4 in.	+ 7 1/2
1 1/2 to 2 in.	13	2 to 2 1/4 in.	+ 22 1/2
		1 1/2 to 1 1/4 in.	+ 35
Standard Commercial Seamless—Cold Drawn or Hot Rolled		Standard Commercial Seamless—Cold Drawn or Hot Rolled	
Per Net Ton		Per Net Ton	
1 in.	\$340	1 1/4 in.	\$220
1 1/4 in.	280	2 to 2 1/4 in.	190
1 3/4 in.	270	2 1/4 to 3 1/4 in.	180
1 1/2 in.	220	4 in.	200
		4 1/2 to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days.
[Open-hearth stock, \$5 per ton above these prices.]

Blue Annealed—Bessemer		Cents per lb.	
Nos. 3 to 8	.....	4.20	
Nos. 9 and 10	.....	4.25	
Nos. 11 and 12	.....	4.30	
Nos. 13 and 14	.....	4.35	
Nos. 15 and 16	.....	4.45	
Box Annealed, One Pass Cold Rolled—Bessemer		Cents per lb.	
Nos. 17 to 21	.....	4.80	
Nos. 22 and 24	.....	4.85	
Nos. 25 and 26	.....	4.90	
No. 27	.....	4.95	
No. 28	.....	5.00	
No. 29	.....	5.05	
No. 30	.....	5.15	
Galvanized Black Sheet Gage—Bessemer		Cents per lb.	
Nos. 10 and 11	.....	5.25	
Nos. 12 and 14	.....	5.35	
Nos. 15 and 16	.....	5.50	
Nos. 17 to 21	.....	5.65	
Nos. 22 and 24	.....	5.80	
Nos. 25 and 26	.....	5.95	
No. 27	.....	6.10	
No. 28	.....	6.25	
No. 29	.....	6.50	
No. 30	.....	6.75	
Tin-Mill Black Plate—Bessemer		Cents per lb.	
Nos. 15 and 16	.....	4.80	
Nos. 17 to 21	.....	4.85	
Nos. 22 to 24	.....	4.90	
Nos. 25 and 27	.....	4.95	
No. 28	.....	5.00	
No. 29	.....	5.05	
No. 30	.....	5.05	
Nos. 30 1/2 and 31	.....	5.10	

Metal Markets

The Week's Prices

		Cents Per Pound for Early Delivery					
		Copper, New York		Lead		Spelter	
Dec.	Lake	lytic	New York	New York	St. Louis	New York	St. Louis
5.....	23.50*	23.50*	85.00*	6.50	6.37½	8.00	7.75
6.....	23.50*	23.50*	85.00*	6.50	6.37½	8.00	7.75
7.....	23.50*	23.50*	84.50*	6.50	6.37½	7.87½	7.62½
8.....	23.50*	23.50*	.....	6.50	6.37½	7.62½	7.62½
10.....	23.50*	23.50*	86.00*	6.50	6.37½	7.75	7.50
11.....	23.50*	23.50*	86.00*	6.50	6.37½	7.75	7.50

*Nominal.

NEW YORK, Dec. 12.

Government fixed prices for both lead and spelter are a probability, thus placing all the markets under control. In the meantime business is of small proportions. Copper continues unchanged. Tin is again nominally higher. Lead is dull and firm. Spelter is lifeless and lower. Antimony is steady and inactive.

New York

Copper.—Negotiations, or at least consultations, are in progress regarding the price of copper for all of 1918, or for a certain period of the year. Whether any change will be made in the 23.50c. price of the Government is mere guess work. It is stated that it is hard for some producers to make money now, and it is also understood that recent cost inquiries by officials have been disappointing rather than otherwise in that they revealed a higher level than expected in some cases. The general feeling seems to be that if any change at all is made, it will be upward. Copper is flowing smoothly to consumers having old contracts or Government contracts. It is being sold at the fixed price to the general trade for the first quarter, while small consumers are receiving metal from jobbers at 24.67½c. for any delivery.

Tin.—There is a strong movement on foot to set aside all import restrictions regarding tin as superfluous and to have its distribution and control in the hands of the American Iron and Steel Institute, which really took control of the market on Monday of this week without official announcement. Considerable of the present confusion may thus be eliminated. It is becoming increasingly evident that many consumers, some of them large ones, are short of tin. One large consumer, however, has parted with some Banca tin for spot delivery to needy buyers, turning down all others. Lack of offers has made a dull market with nominal prices continually rising to 86c., New York, yesterday, for spot Straits. Cables are very much delayed, hindering business. There has been a moderate inquiry for prompt shipment from England and a little business was done at 71c. to 72c., subject to license. Arrivals to date have been 460 tons, with 4840 tons afloat. The London market continues to advance, spot Straits being quoted yesterday at £299 per ton, an advance of £5 in the week.

Lead.—The market has been dull and without interest, but remains firm at 6.50c., New York, or 6.37½c., St. Louis, for early delivery in the outside market, with the quotation of the leading interest still at 6.25c., New York. There has been activity here and there, but the quantities disposed of have not been large. Most producers are entirely sold up for December and largely so for January. Rumors have been current of larger domestic and export transactions or negotiations. It is understood that the Government has closed for its needs for 30 days, but the quantity and price are not known. It is generally expected that a maximum price for lead will be established soon.

Spelter.—There has been no demand and the market has continued to weaken until now prime Western for early delivery is quoted at 7.50c., St. Louis, or 7.75c., New York. Production is constantly getting less, but to what extent it has been curtailed is not known. Some place it at 30 per cent; others at 50 per cent, but

probably 40 per cent is a fair estimate. Nothing has been decided apparently in the price fixing matter nor has any announcement been made as to the Government's probable needs. The entire situation is discouraging and a turn for the better is not expected until supply and demand reach a balance. Some think this condition is near at hand.

Antimony.—The market is again quiet after some display of life as a result of the expected effect of the embargo on imports. Available brands are quoted at 15.25c. to 15.50c., New York, duty paid.

Aluminum.—Demand is small and the market is inactive at 36c. to 38c., New York, for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The market is practically unchanged. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible (nominal).....	23.50
Copper, heavy and wire (nominal).....	23.50
Copper, light and bottoms.....	21.00 to 22.00
Brass, heavy.....	17.25 to 17.50
Brass, light.....	12.00 to 12.50
Heavy machine composition.....	23.75 to 24.00
No. 1 yellow rod brass turnings.....	14.50 to 14.75
No. 1 red brass or composition turnings.....	19.00 to 19.50
Lead, heavy.....	6.00
Lead, tea.....	4.50
Zinc.....	6.00

NEW TRADE PUBLICATIONS

Gear Shaping Machine.—Fellows Gear Shaper Co., Springfield, Vt. Booklet entitled "Design of Splines and Clutch Teeth." Size, 6 x 9 in.; pages, 22. Is a collection of suggestions relating to the use of the involute curve in the design of splines and clutch teeth. A number of typical illustrations serve to supplement the text matter in which particular reference is made to the use of a gear shaping machine for their production. Condensed specifications of two gear shaping machines are included.

Tool Grinding.—Norton Co., Worcester, Mass. Pamphlet. Illustrates and describes the machinery and methods employed for grinding cutters, reamers, drills, taps, dies and lathe planing machine tools. The important points to be observed in connection with each class of tools are brought out, the text being supplemented by numerous line and half-tone illustrations. Recommendations as to the grains and grades of wheels to be employed are included in a number of cases.

Turret Lathes.—Gisholt Machine Co., Madison, Wis. Bulletin entitled "Standardizing in the Machine Shop." Points out the advantages to be derived from the standpoint of increased output and lowered production cost by the use of the company's turret lathe. This is done by a series of illustrations of parts that have been produced together with views of the machine equipped for handling the different pieces and brief descriptions of the work that was done. In a number of cases dimensioned drawings are presented and in each instance the time required to complete the work is featured.

Motor-Driven Speed Lathe.—Oliver Machinery Co., Grand Rapids, Mich. Circular. Illustrations and descriptive matter explain the operation of a motor-driven woodworking speed lathe employing either direct or alternating current motors. The construction of the lathe is described at some length and a number of illustrations showing the various features are included.

Pneumatic Tools.—Keller Pneumatic Tool Co., Fond du Lac, Wis. Three pamphlets. Mention a line of chipping and riveting hammers and a sand rammer. In the first two the construction of the hammers is explained in some detail with illustrations of the various styles that can be supplied and their component parts. In the last bulletin the advantages of pneumatic ramming in foundries and for other work is touched upon with illustrations of the different types available.

Toolroom Specialties.—Taft-Peirce Mfg. Co., Woonsocket, R. I. Catalog No. 2. Describes a line of toolroom specialties which includes bench plates, boring equipment, gages of all kinds, knees, parallels, sine bars and V-blocks. Each specialty is given a single loose leaf with an illustration, brief description and in some cases tables of the various sizes that can be supplied. A feature of the catalog is its paging according to the style numbers of the various articles covered. Mention is also made of the work which the company is prepared to do in the design and manufacture of special gages, fixtures or tools.

Fence Wire Corrosion and Its Causes

Short Life of Present-Day Barb Wire as Compared with the Older—Influence of Copper—Corrosion Under Trees and Bushes

BY OLIVER W. STOREY

ABOUT 15 years ago the U. S. Department of Agriculture received many complaints from farmers stating that wire fences corroded rapidly. As a result of these complaints an investigation was begun at that time by the U. S. Department of Agriculture to bring about, if possible, an improvement in the corrosion-resisting qualities of fence wire. Notwithstanding this investigation, the preliminary results of which are embodied in Farmers' Bulletin No. 239, there appears to have been made but slightly better wire since that time. Farmers continue to complain of the short life of the present-day wire as compared to the older wires, some of which are still in service. This paper gives the results of an investigation which has determined the cause of the longevity of the older steel wires.

A study of the analyses of a large number of fence wires has resulted in the conclusion that the presence of a sufficient amount of copper in steel wire determines whether that wire is resistant to rapid corrosion. The results have without exception shown that where two steel wires have been subjected to identical corroding conditions the wire with an appreciable percentage of copper has shown the lesser corrosion. In the light of recent extensive investigations on the corrosion of iron and steel, especially copper steels, these results, covering a corroding period of from 20 to 30 or more years, are of much significance in that they confirm the results obtained in corrosion tests covering a short period of time.

The general complaints of the users of wire fences, given in Farmers' Bulletin No. 239, was that the recently manufactured fence wire corroded rapidly, lasting but a few years, while some of the old wire which had been erected on their farms 30 years before was still in service. As a result of these complaints A. S. Cushman made an investigation in which he came to the following conclusions:

That modern Bessemer and open-hearth steel rusts much more rapidly than iron wire.

That manganese, especially if it is unevenly distributed in the steel, is at least in part the cause of the trouble.

Since that time Cushman has been an advocate of low manganese pure irons wherever resistance to corrosion is desired and recently has also contended that copper does not increase their resistance to corrosion.

Obtaining of Reliable Data

In making a study of corroded fence wire it is difficult to obtain reliable data on the length of service of wire and it also is difficult to obtain comparative specimens which have been subjected to identical corroding conditions. Where fences have been erected for more than a few years it is almost impossible to obtain an accurate history of them. In the case of barb wires, strands in good condition are usually salvaged from the old fence where it is replaced and this adds to the complications. Therefore, in comparing different strands of barb wire great care must be used to determine the history of each strand.

However, it is possible in some cases to approximate the age of fence wire, especially wire that has been erected for a long period. Occasionally wire fences are nailed to trees and the depth to which the wires are imbedded in the growing tree gives a basis for estimating their age. Much of the barb wire erected 20 to 30 or more years ago had barbs of peculiar patterns

that were made only during that period. The age of these wires may be approximated.

The rate of corrosion of iron and steel varies with the location. Not only does this hold true with reference to conditions as influenced by the topography of the region and the presence of industrial corroding gases, but also to the position of the wire on the fence; whether it is the bottom or top strand, whether shaded, covered with brush, next to a post or tree, or in the open.

A careful inspection of a wire fence shows that the bottom strands generally are in much better condition than the top strands. This is also true of the wire lying next to a post or a tree and also where the wire is covered or protected by trees and shrubbery. Since the different strands of wire on the same fence are subject to varying corrosive action, great care must be used in comparing them.

The nearest to the ideal condition for a corrosion test is found in a strand of barb wire made by twisting together two wires of different compositions. Even here the galvanizing on one wire may be slightly different from the other. While this influences a short-time corrosion test, it is not of moment in a test covering 25 or 30 years, provided that the galvanizing is of the usual grade found on barb wire.

The objection will also be raised that electrolytic action between the two wires will influence the results appreciably. A careful study has shown that the influence of electrolytic action on the corrosion of two dissimilar wires in a strand of barb wire is practically nil. There are few points of contact between the two wires and the potential difference between the two wires is necessarily minute. The work of Aston, together with some research by C. F. Burgess and also by the writer along the same lines, indicates that the electrolytic action of rust on the surface of iron and steel is far more important than any minute difference in potential due to slight differences in composition. Many samples were found where the two wires in a strand of barb wire were not in contact over a distance of an inch or more, but the corrosion at these places did not vary from the points where the wires were in contact, though the two wires were dissimilar in composition and corroded at different rates. These observations led to the conclusion that the two wires of a strand of barb wire that has been in service for 20 to 30 years may be compared and conclusions based on any difference in composition.

Data on Fence Wire

At Mineral Point, Wisconsin, and at several other points in the same State, strands of barb wire were found in which the two wires were corroding at a dissimilar rate. In some cases the difference in corrosion was slight while in one case one wire had practically corroded entirely away while the other was but slightly corroded. Fortunately the age of most of these wires could be approximated.

Much of the barb wire made previous to 1892 was made by small manufacturers who did not control the sources of supply of raw material, but merely bought the wire and fabricated the strands. Under such conditions it is not surprising that many strands of barb wire were built up of two wires that corroded at unequal rates.

Many of the fences, when erected, had been fastened to oak trees. These barb wires, in some instances, are embedded to a depth of four inches. The barbs are mostly of the obsolete two-point Lyman, and other similar patterns which were generally discontinued at the expiration of the Glidden patents in 1892.

*From a paper presented at the thirty-second general meeting of the American Electrochemical Society, Oct. 5, 1917, at Pittsburgh. The author is research engineer, C. F. Burgess Laboratories, Madison, Wis.

Many of the barb wires obtained were probably erected in the period from 1885 to 1892 or 25 to 30 or more years ago.

Not all of the barb wire was of the type in which one wire corroded more rapidly than the other. This was a characteristic of the older wires. Many specimens were obtained in which the two wires corroded at equal rates. The barb wires of more recent manufacture generally do not show any difference in the rate of corrosion between the two wires composing the strand.

A close examination of barb wire fences at various places in southern Wisconsin shows that there is available much wire in which the two wires composing the strand corrode at dissimilar rates. A close inspection is necessary to note this difference, since the twisted wires confuse the eye. Often it is necessary to untwist a small section and flake off the adhering rust.

One old woven wire fence showed a difference in the rate of corrosion of the various horizontal wires. Care has to be taken in selecting woven wire specimens, since most woven wire fencing is of more or less recent origin and there is a decided difference in the durability of the galvanizing on the various horizontal wires. The top strands also corrode at a much higher rate than do the lower strands in the same fence.

The appearance of the rust varies depending upon the locality and upon the resistance of the specimen to

rust on those wires that show small resistance to corrosion is yellow or light red in color, is flaky and may be easily removed. Also, the less resistant wires are deeply pitted, while the more resistant wires corrode more or less uniformly.

Complete analyses of several strands of barb wire were made when an investigation with reference to the damage done by sulphur gases at Mineral Point, Wis., was first begun. It was necessary to determine the kind of steel used and also to determine if possible the cause of the marked difference in corrosion of the wires constituting the strands of barb wire. These total analyses are given in the table.

A study of these analyses shows that there is no relation between the percentage of any element and the amount of corrosion with the exception of copper. These analyses also show that all of the barb wire is made of Bessemer steel, excepting one which is made of wrought iron. The woven wire fence (Pittsburgh Welded Steel) is made of basic open-hearth steel. Many different kinds of barb wire have been examined, but only one made of wrought iron wire has been found.

In view of the work of Burgess and Buck and various other investigators who have shown that copper when present in small amounts in iron and steel decreases the rate of atmospheric corrosion to a marked extent, it seemed certain that the copper was the cause of the high resistance to corrosion of the wires that had been analyzed. Therefore, the copper content of a large number of wires used in barb wire fences was subsequently determined. The results are given in the table.

[The author gives at this point complete data of the history of each piece of wire, discussing conditions in each case.]

Conclusions

The data obtained show conclusively that copper steel is highly resistant to corrosion and that the older steel fence wire containing copper is much more durable than that free from copper. The resistance to corrosion is independent of the percentage of manganese in the steel.

[The author discusses at length Farmers' Bulletin No. 239 and gives a review of copper steel investigations.]

Origin of Copper in Steel Fence Wire

The data presented show that much of the Bessemer steel made 25 or 30 years ago contained copper, while most of that made more recently and at the present time contains but a trace. The presence of copper in open-hearth steels is easily explained, as it comes largely from the copper contained in the scrap iron which is used in that process. Since metallic copper was not purposely added to the Bessemer steel made 25 or 30 years ago, it must have had its origin in the iron ore used in producing the pig iron.

A study of the ores of the United States shows that the Lake Superior ores produce a steel containing at most but a trace of copper. However, the ores obtained in the eastern United States contain varying amounts of copper, the Cornwall ores of eastern Pennsylvania sometimes producing an iron or steel analyzing as high as 1 per cent copper. Some of these ores are treated for their copper content.

About 25 to 30 years ago the Lake Superior ore district had not assumed the important part in the metallurgy of iron and steel that it now occupies, while the iron ores of the eastern United States formed an important part of the output of this country. In addition to this, 200,000 to 300,000 tons of copper-bearing iron ores were imported in some years from Cuba.

While such cupriferous steel and wrought iron was made previous to 25 or 30 years ago, the character of the ore used for making Bessemer steel in this country has changed, so that at the present time little cupriferous steel is made by that process. This is confirmed by the results of the copper analyses made on a large number of fence wires. With one exception all of this wire is of steel and probably Bessemer steel. Most of the older barb wires contained copper in varying amounts, while the wire of recent manufacture contains but a trace, less than 0.02 per cent. Two samples of wrought iron fence wire were analyzed. These two

corrosion. Where the atmosphere is relatively pure and the corrosion rate low, the rust on all fence wire, after several years' exposure, is a deep brown in color and adheres tightly to the wire. When the iron is first exposed to the atmosphere, after removal of the galvanizing or adhering rust, the rust is bright red in color. The color appears to change gradually to a deep brown.

Wherever the atmosphere becomes more corrosive, due not only to the presence of industrial gases, but also to excessive moisture as in river valleys and swamps, and during the moist warm spring and summer months, there is a marked difference between those wires that are highly resistant to corrosion and those that are easily corroded. The rust on those wires that resist corrosion is a deep brown and adherent, while the

Table of Analyses of Fence Wires in Wisconsin

Location	No.	Kind of Metal	Copper	Carbon	Manganese	Phosphorus	Sulphur	Silicon
Mineral Pt.	1a	Basic O-H Steel	0.18	0.07	0.42	0.021	0.055	0.03
Mineral Pt.	1b		0.087					
Mineral Pt.	1c		0.041					
Mineral Pt.	1d		Trace					
Mineral Pt.	2a	Bess.	0.017	0.05	0.45	0.077	0.072	
Mineral Pt.	2b	steel	0.16					
Mineral Pt.	3a	Bess.	0.22	0.10	0.31	0.090	0.069	0.13
Mineral Pt.	3b	steel	0.018					
Mineral Pt.	4a	Bess. steel	0.11	0.06	0.49	0.098	0.120	Trace
Mineral Pt.	5a	Wrought iron	nil	0.03	0.10	0.136	0.010	
Mineral Pt.	6a	Bess.	nil		0.25	0.060		
Mineral Pt.	6b	Bess.	nil	0.07	0.29	0.043	0.085	
Mineral Pt.	7a	Bess.	0.15	0.09	0.64	0.152	0.048	
Mineral Pt.	7b	Bess.	0.023	0.13	0.62	0.114	0.066	0.01
Mineral Pt.	8a	Bess.	nil	0.05	0.25	0.129	0.098	
Mineral Pt.	8b	steel	0.24	0.07	0.45	0.116	0.097	
Mineral Pt.	9a	Steel	0.038					
Mineral Pt.	9b	Steel	0.088					
Mineral Pt.	10a	Steel	Trace					
Mineral Pt.	10b	Steel	0.06					
Mineral Pt.	11a	Steel	0.16					
Mineral Pt.	11b	Steel	0.097					
Mineral Pt.	12a	Steel	0.120					
Mineral Pt.	13a	Steel	0.397					
Mineral Pt.	14a	Steel	0.11					
Mineral Pt.	14b	Steel	0.04					
Mineral Pt.	15a	Steel	0.06					
Mineral Pt.	15b	Steel	0.224					
Mineral Pt.	About 15 to 20 barb wires, both new and old and heavily corroded, contained less than 0.03 per cent copper.							
Cuba City.	16a	Steel	0.07					
Cuba City.	16b	Steel	0.13					
Cuba City.	Ten barb wires, both new and old and heavily corroded, contained less than 0.02 per cent copper.							
Madison.	17a	Steel	0.15					
Madison.	17b	Steel	0.097					
Madison.	18a	Wrought iron	0.01					
Madison.	18b	Steel	0.063					
Madison.	19a	Steel	0.031					
Madison.	19b	Steel	0.015					
Madison.	20a	Steel	0.130					
Madison.	20b	Steel	0.008					
E. Milwaukee.	21a	Steel	0.148					
E. Milwaukee.	21b	Steel	0.005					
E. Milwaukee.	22a	Steel	0.233					
E. Milwaukee.	22b	Steel	0.005					
E. Milwaukee.	23a	Steel	0.01					

stands were made by the same firm and contained little copper.

Apparently the present-day wrought iron is likely to have copper in it. This has been demonstrated by several analyses of wrought irons of recent manufacture brought to the attention of the writer, and also by the report of Committee A-5 on Corrosion of Iron and Steel of the American Society for Testing Materials. The committee reports with reference to the analysis of the wrought iron sheets to be used in the extensive corrosion tests of roofing sheets:

It is interesting to note that the puddled irons have a high copper content, probably due to the use of eastern Pennsylvania ores, and an effort will be made to secure a genuine puddled iron substantially free from copper.

The present open-hearth steel contains varying amounts of copper, as shown in the woven wire fence analyses of the table. Analyses of open-hearth steels show that the amount of copper present varies over a considerable range in successive heats, depending upon the nature of the scrap used. Where open-hearth steel is used for fence wire this variation in the different heats will show up in a difference in the rate of corrosion of the different strands of wire. This is apparent in the table, where the copper content of the horizontal strands of a woven wire fence made of basic open-hearth steel varied, the strand low in copper showing the greatest corrosion.

Corrosion Under Trees, Bushes, Grass, Etc.

The writer's observations on the corrosion of galvanized wire next to the ground, in bushes, etc., confirm in part the findings of Cushman. It was found that wherever galvanized wire was in contact or covered with weeds, brush, bushes, under trees or adjacent to the points where stapled to trees or posts, the galvanizing was found to be much more durable than where it was in the open and subjected to the wind and sunshine. Some wires that evidently had been in service from 20 to 25 years were found with the galvanizing in good shape. Even where sulphur dioxide fumes caused rapid corrosion, this protective effect was observed.

The galvanizing, when found intact under such conditions, was usually coated with a hard white film, probably a basic carbonate of zinc. The effect of this salt as a positive agent, and the conditions under which it forms, have not been studied, but it may have an important bearing on the corrosion of zinc.

The effect of sunlight also may be a factor. This is suggested by Friend's work, in which he finds that sunlight accelerates the rusting of iron in the presence of water.

While the galvanizing under such unfavorable conditions is much more durable than under apparently favorable conditions, it does not appear that iron or steel shows the same characteristics. Many observations have been made on woven wire fences that have been erected for such a period of time that the galvanizing has been entirely removed. The bottom portion of the fence which has been in contact with the wet grass and weeds has been badly corroded, while the upper portion is in much better condition. It was observed that the steel in contact with the grass was covered with a loose, yellow flaky rust, while that further up was covered with a deep-red adherent rust.

These observations cannot be considered conclusive and more work on this point is necessary. In many places the burning of the dry grass has caused conditions which make any observations worthless. If it can be definitely proved that iron and steel corrode at an accelerated rate at the bottom of a fence or in brushes and weeds, and that the galvanizing is much more durable under those conditions, Cushman's hypothesis, that the corrosive electrolytic action is diminished by keeping the wires electrically neutral through frequent connections to the earth, is untenable.

Summary

It has been definitely established that the durability of old steel fence wire is due to the presence of copper. Manganese does not increase the corrosion of steel, and its absence does not decrease the corrosion.

The copper in the early steel and wrought irons came from the copper-bearing ores of the eastern United States and imported ores. The proportion of copper steel made decreased with the increasing importance of the copper-free Lake Superior ores.

Steel fence wire containing copper is as durable as wrought iron.

Present-day steel fence wire usually does not contain copper and therefore corrodes rapidly.

Under ordinary atmospheric conditions zinc corrodes more slowly under conditions favoring rapid corrosion of iron, and vice versa, iron corrodes more slowly under conditions favoring rapid corrosion of zinc.

The life of fence wire is dependent upon the quality of both the galvanizing and iron or steel base. Since the galvanizing is usually thin, the life of the fence depends principally upon the iron or steel base, which should be highly resistant to corrosion.

War on Austria Has Little Effect

CINCINNATI, Dec. 10.—The declaration of war with Austria will have very little effect on the labor market in Cincinnati and vicinity. Very few Austrians that are not naturalized are employed in different manufacturing plants and none in those making war munitions. The manufacture of non-essentials is gradually being reduced, thus releasing labor in these plants for more important work in machine shops. Lately a large toy manufacturing concern in the Central West has closed its plant temporarily, as it is not able to make shipments to eastern points. Second hand machine tools are very scarce, especially larger sizes of lathes and boring mills. Makers of machine tools have enough business in hand to keep them operating several months ahead and are not able to take on much new business. The Standard Ordnance Co., Hamilton, Ohio, has issued a new list of machine tools, but as far as known they have not yet been able to purchase on it.

Attempts at profit sharing go back nearly 100 years, according to W. A. Grieves, assistant secretary Jeffrey Mfg. Co., Columbus, Ohio, in 100 per cent. Of 300 such plans in operation in England since 1838, 133 still survive. Of the 56 per cent which failed, 59 were due to apathy of employees and consequent dissatisfaction of employer with the results. Twenty-nine schemes failed because of low profits, 25 because of abandonment of the business enterprise, 22 because of changes in or transfer of the business, four on account of the dissatisfaction of employees, four because the job was finished, and four for miscellaneous reasons. Eight gave no return, and eight substituted increased wages or shorter hours.

A case of war time efficiency is noted in the experience of the Electrical Apparatus Co., Ltd., Vauxhall Works, Lambeth Road, London. Although the staff during twelve months numbered 263, as against 319 in 1913, the output was just twice as great. This is the more notable since, in the spring of 1913, the directors had come to the conclusion that the output could not be increased without enlarging the works, complete plans for which had, in fact, been prepared. Overtime was, moreover, the rule in 1913, and to-day many qualified men have been replaced by boy and girl labor. The improvement is in part attributed to a simplification of designs.

A report of the Louisville city building inspector shows that 51 power boilers and 34 low pressure boilers were installed in Louisville in 1917 at an estimated outlay of \$75,000, against 66 power boilers and 44 low pressure boilers the year before, at an estimated outlay of \$94,000.

The Galvanizing Corporation of America, Inc., 244 Eagle Street, Brooklyn, N. Y., has taken over the business of the Metal Treating & Equipment Co., and will carry on the business of job galvanizing and the installation of electrogalvanizing plants.

PRICE CHANGES UNLIKELY

Conference at Washington with Steel Manufacturers' Committee

WASHINGTON, Dec. 11.—A conference between the members of the War Industries Board, the Federal Trade Commission and a large committee of steel men was held at the headquarters of the Council of National Defense yesterday to consider the general status of the iron and steel industry with reference to war preparations and the question of the possible revision of the schedule of controlled steel prices which, pursuant to agreement, will expire on Jan. 1. The officials present were Daniel Willard, chairman; Judge R. S. Lovett, B. M. Baruch, R. S. Brookings, Hugh Frayne, Lieut.-Col. Palmer E. Pierce and H. P. Bingham, of the War Industries Board; A. H. Legge, general manager of the purchasing commission and J. Leonard Replogle, director of steel distribution, Council of National Defense; Commissioner Joseph E. Davies, Dr. Francis Walker and W. W. Wooster, of the Federal Trade Commission; W. A. Blauvelt and F. J. Herman of the Fuel Administration. The representatives of the steel industry were: Judge E. H. Gary, chairman; James A. Farrell, president, and W. J. Filbert, comptroller, United States Steel Corporation; Charles M. Schwab, chairman, and E. G. Grace, president, Bethlehem Steel Co.; A. C. Dinkey, president Midvale Steel & Ordnance Co.; E. A. S. Clarke, president Lackawanna Steel Co.; Willis L. King, vice-president Jones & Laughlin Steel Co.; John A. Topping, chairman Republic Iron & Steel Co.; A. F. Huston, president, and F. H. Gordon, general sales manager, Lukens Steel Co.; Karl G. Roebing, general sales manager John A. Roebing's Sons Co.; James A. Burden, president Burden Iron Co.; W. Vernon Phillips, president F. R. Phillips & Sons Co.; F. N. Beegle, president Union Drawn Steel Co.; W. S. Horner, president National Association of Sheet and Tin Plate Manufacturers; Eli Joseph of Joseph Joseph & Brothers Co., and James B. Bonner, representing the American Iron and Steel Institute. Roy A. Rainey and Scott Stewart of the Rainey Coke Co. were also present.

Trade Commission Conference This Week

While the steel men were invited to Washington to "review the prices for their products agreed upon through previous conferences between the War Industries Board and the industry," the price question received but little attention. Chairman Willard of the War Industries Board stated that the Federal Trade Commission was engaged in the preparation of a detailed report upon costs of production and that until the data contained therein were in the possession of the board it would not be practicable to discuss the details of any revision of existing prices that might be deemed necessary. As the result of the discussion of this phase of the subject it was decided that the steel men should return to Washington on Dec. 14 for a conference with the Federal Trade Commission.

In discussing the general situation in the iron and steel industry the steel men assured the members of the War Board that the heartiest co-operation on the part of the entire trade was being accorded the Government and that production was keeping well abreast of demand. Certain suggestions were made to the board relative to allotments of orders and methods of distribution which Chairman Willard received with evident favor. The conference then adjourned without the fixing of any date for the return of the committee to meet the War Board.

No Material Price Changes

The impression is gaining ground here that there will be no important readjustment of prices on Jan. 1. This is based on a number of considerations. In the first place, the publication of detailed schedules of controlled prices on basic materials, with appropriate differentials and extras, has served as a general trade stabilizer and any radical changes would have a demoralizing effect. Secondly, the War Industries Board has no information indicating that changes are necessary and is not disposed to disrupt an arrangement that is working very satisfactorily. In the third place, the Federal Trade Commission is not likely to be ready to submit its final conclusions in time for a readjustment of prices by Jan. 1, if any readjustment should be deemed desirable. Finally, there is a disposition to adhere to the present iron and steel price schedules until it has been determined what course Congress will pursue with respect to price fixing legislation and especially as to the fate of the Pomerene bill. Summarizing the situation, therefore, it is the best opinion here that the existing schedules will remain in force for a considerable period after Jan. 1, probably as the result of a formal extension on that date.

W. L. C.

Carnegie Veterans' Annual Dinner

The annual dinner of the Carnegie Veterans' Association, composed of the surviving 35 partners of Andrew Carnegie in the Carnegie Steel Co., Pittsburgh, when it was taken over by the United States Steel Corporation, was held Friday evening, Dec. 7, in the home of George Lauder, in the East End, Pittsburgh. Mr. Lauder having been an early business partner of Andrew Carnegie when he started in the steel business. Owing to the condition of his health Mr. Carnegie was not present at the dinner, but sent a telegram of warm felicitation. Among those also absent from the dinner were Col. Millard Hunsiker, who is in Paris; John G. A. Leishman, former Ambassador to Germany; Ambrose Monell, now a colonel in the Army Aviation Corps, and John A. Potter, superintendent of the Homestead Steel Works, at the time of the noted strike there. Others absent were W. E. Corey, now chairman of the Midvale Steel & Ordnance Co., also W. L. Abbott, formerly president of Carnegie, Phipps & Co., who is now living in Philadelphia. All former dinners of the Carnegie Veterans' Association have been held in New York City. There were addresses by a number of former partners of Mr. Carnegie, and at the close of the dinner officers that have served since the organization was formed were re-elected as follows: Andrew Carnegie, president; Charles M. Schwab, vice-president, and Charles L. Taylor, secretary.

Fuel Administrator Garfield has announced that the authorized advance of 35 cents per ton in the price of anthracite coal will not be allowed on coal in the hands of jobbers or retailers when the increase was made effective Dec. 1. A temporary increase of 25 cents per ton has been granted to coal operators in various counties in the Jellico region of Kentucky and Tennessee by reason of the fact that apparently the operators of this region failed to understand the rulings of the administration regarding the filing of cost sheets as a preliminary to applications for change of price.

The regular monthly meeting of the Association of Iron and Steel Electrical Engineers will be held in the Hotel Chatham, Pittsburgh, Saturday, Dec. 15. G. E. Stoltz of the Westinghouse Electric & Mfg. Co. will present a paper entitled, "Fly Wheels on Steel Motors." The January meeting of the Pittsburgh session will be a joint meeting with the American Institute of Electrical Engineers. Papers will be presented on generation, distribution and consumption of power, as well as power factor correction.

Pittsburgh and Nearby Districts

The first license allowing a German-owned concern to continue business under the supervision of the alien property custodian, was granted at Washington, D. C., on Thursday, Dec. 6 by the War Trade Board to the Orenstein-Arthur-Koppel Co., Koppel, Pa. A. Mitchell Palmer, alien property custodian, appointed T. H. Given, president of the Farmers Deposit National Bank of Pittsburgh, as his representative to direct the company's operations. The company, which is entirely owned by German capital, is engaged in the manufacture on a large scale of transportation facilities and equipment for use in industrial plants.

At the urgent request of the United States Navy Department, the Carnegie Steel Co. is now operating the plant of the Alloy Steel Forging Co., at Carnegie, Pa., near Pittsburgh. For some time this plant has been making steel forgings for small naval guns. The Alloy Steel Forging Co. was incorporated in Delaware in 1911, with an authorized capital stock of \$1,000,000, of which \$500,000 is outstanding. W. S. Potter is president and B. L. Beck, secretary.

The Cambridge Foundry & Machine Co. has been organized at Cambridge, Ohio, with a capital of \$50,000 to do a general foundry and machine business.

The Brownsville Foundry & Machine Co. has been formed at Brownsville, Pa., and has taken over the foundry and machine shop formerly operated by J. H. Herbertson's Sons. The new company will engage in the manufacture of mine cars, and will buy considerable new machinery and other equipment.

The Davis Break Beam Co. plans to make large additions to its plant at Johnstown, Pa., for which considerable new equipment will be needed.

The Schlieper Engineering Co., Pittsburgh, is in the market for a considerable number of single-purpose lathes.

The Penn Mold and Mfg. Co., Canal Dover, Ohio, is in the market for an 18 or 24-in. lathe or planer.

The Savage Arms Corporation, Sharon, Pa., has an inquiry out for a large shear and a lifting magnet.

Edgar E. Brosius, contracting engineer, Pittsburgh, is furnishing the Brosius automatic mud gun equipment for seven new blast furnaces now being built in this country. This Brosius gun is entirely automatic in its operation, requiring no one near the furnace while the hole is being stopped. This feature entirely eliminates the possibility of accident to the workmen, and permits the employment of less skilled labor to operate the gun.

At a meeting of the board of governors of the Traffic Club of Pittsburgh, held last week, it was decided unanimously to do away with the annual dinner of the club, which has been held early each year for many years. The action was taken as a conservative war measure.

The Manufacturers' Light & Heat Co. of Pittsburgh, supplier of natural gas, has filed notice with the Public Service Commission that on and after Jan. 1, next, it will discontinue the service of natural gas to all manufacturing plants that it is now supplying, desiring to conserve its entire production of gas for domestic consumers. This notice follows similar notices filed by other natural gas companies, furnishing gas to manufacturing plants in Western Pennsylvania, Eastern Ohio and West Virginia, against which protests have been filed by a number of manufacturers.

The regular monthly meeting of the Pittsburgh Foundrymen's Association will be held in the Fort Pitt Hotel, Monday evening, Dec. 17. A program of entertainment has been prepared in keeping with the holiday spirit. W. S. Diggs, chairman of the Pittsburgh 4-minute men, will make an address on "Co-operation." W. S. Sanderson, Pittsburgh representative of the Carborundum Co., is chairman of the entertainment committee. Bayard Phillips continues as acting secretary of this organization, no successor having yet been appointed to succeed F. H. Zimmers, deceased.

L. A. Green, Park Bldg., Pittsburgh, representative in that district of the Bedford Foundry & Machine

Co., Bedford, Ohio, recently sold six 7½-ton and one 20-ton electric cranes to the Wm. Cramp & Sons Shipbuilding Co., Philadelphia; four 7-ton cranes to the Hampton Roads Shipbuilding & Dry Dock Co., Norfolk, Va.; two 10-ton cranes to the Pittsburgh Foundry & Machine Co., Pittsburgh; one 50-ton and two 10-ton cranes to the Nagle Steel Co., Pottstown, Pa.; one 8-ton crane to the Leetsdale Foundry & Machine Co., Leetsdale, Pa.; one 5-ton crane to the Massillon Steel Castings Co., Massillon, Ohio, and one 20-ton crane to the Phoenix Iron Works, Phoenixville, Pa.

Wages of Men and Women in Germany

Wages of both men and women in German industrial lines have largely increased as a result of the war. According to returns obtained by the Imperial Statistical Office, in the case of men the average earnings for a day's work in all trades combined fell about 1 per cent between March and September, 1914, but by September, 1916, it had risen 46 per cent above the level of March, 1914. The period of greatest increase (14.8 per cent) was during the first winter of the war. From March, 1915, to September, 1915, there was an advance of 11.4 per cent, in the next six months an increase of 6.7 per cent and from March, 1916, to September, 1916, an increase of 7.8 per cent. In the case of women workers there was a drop of 15.3 per cent in daily earnings between March and September, 1914, but by September, 1916, their earnings had risen to a figure 54.1 per cent above that of March, 1914. The greatest increase in women's wages occurred between September, 1915, and March, 1916, the rise in this period being 18.3 per cent. No reference is made to the question as to how far increased earnings may be due to the working of overtime.

Ferromanganese Sales—Plates for Government

CHICAGO, Dec. 12.—(By Wire).—Transactions in 80 per cent ferromanganese have been made at \$240 with the freight allowed, although some sellers quote \$250.

Practically all the plates which the local mills are producing are going in the direction of the Government. They can be had in limited quantity, principally in the East, at 3.25c. Pittsburgh.

American Steel & Wire Co. Plants Closed

CLEVELAND, Dec. 12.—(By Wire).—The nine Cleveland plants of the American Steel & Wire Co. have been shut down since Saturday night because of scarcity of coal. Only two small open hearth furnaces are in operation. The five blast furnaces are banked. No relief is in sight.

Market Reports Delayed

Owing to storms raging in the Central West, it has been impossible to obtain the usual market reports of THE IRON AGE from Chicago, Cleveland and St. Louis by either telegraph or mail.

Reports received through Sweden state that the quantity of iron ore available in Germany is insufficient to meet the demand, according to the London *Iron and Coal Trades Review*. Production has been greatly hampered also by the scarcity of railroad cars. The military authorities have formed a plan for the distribution of raw materials among the various works with the object of preventing some furnaces having a surplus, while others have inadequate supplies.

The B. A. Wesche Electric Co., Cincinnati, maker of electric generators and motors, has commissioned the Reliance Engineering Co., Cincinnati, to draw up plans for a new factory building to be erected on Reading Road, near Ryan Avenue. The company's present location is at 327 East Sixth Street.

The Buffalo-Springfield Roller Co., Springfield, Ohio, has increased its capital stock from \$125,000 to \$500,000, and will increase the capacity of its present plant.

PERSONAL

W. L. Saunders, chairman Ingersoll-Rand Co., New York, spoke at the ceremonies to welcome the American Society of Civil Engineers into the Engineering Societies Building, New York, on Dec. 7. He told how advisers of the President had succeeded in placing an engineer upon the proposed list of members of district boards created to determine exemptions under the draft law. This was regarded as reasonable in view of the fact that the present war is to so large an extent a clash of industries and many men engaged in industrial work might render greater service at home than in the trenches. These lists were sent to the governors of states and when the lists were returned to the President more than 90 per cent of the engineers were scratched off to give place to lawyers and others. He regarded this circumstance as a logical result of the fact that the engineering societies are not organized for civic service and he urged, as he has done before, the getting together of engineers as technical men doing work as citizens.

Antonio C. Pessano, who has been president and general manager of the Great Lakes Engineering Works, Detroit, since its organization in 1902, having been elected recently chairman of the board of directors, will hereafter have his office in the Hanover Building, New York, instead of at Detroit. John R. Russel, Detroit, was elected president to succeed Mr. Pessano; H. W. Hoyt, vice-president and treasurer; John A. Ubsdell, vice-president and general manager, and F. G. Morley, secretary. The changes indicated were made on Mr. Pessano's recommendation in view of the great expansion in the company's operations. He will take up his residence in New York to be in constant touch with the interests from which the Great Lakes Engineering Works secures its large oversea business. The company's entire program of shipbuilding under contract is for ocean service, and these contracts will average one ship every two weeks for delivery in 1918.

W. H. Hundt, who has been connected with Luria Brothers & Co., old material dealers, New York, for the past seven years, has enlisted in Battery E, 305th Field Artillery, and is now stationed at Camp Upton, Yaphank, Long Island.

R. Ried, of the United Export Bureau, 239 West Thirty-ninth Street, New York, will start this month on an extended tour of Central and South American countries. His plan is to spend two or three weeks in every important city. Readers of THE IRON AGE who would avail themselves of Mr. Ried's acquaintance with South American trade condition to secure information that may develop in connection with his trip may communicate with him at the above address.

J. W. White, formerly with the Pittsburgh office of the Westinghouse Electric & Mfg. Co., and later with the Allis-Chalmers Mfg. Co., has returned to the Westinghouse Co., as manager of the power and railway division of the Detroit office of the company.

Paul Wick, assistant manager of sales for the Trumbull Steel Co., Warren, Ohio, has resigned and will enter the Navy.

Harry Resnick, formerly with the Fairbanks Co., Pittsburgh, and for 13 years its credit manager and assistant sales manager, but who resigned some time since to become assistant manager of Luria Brothers & Co., dealers in iron and steel, Park Building, Pittsburgh, has been appointed manager of that concern, succeeding David L. Wilkoff, who has resigned. Harvey M. Clymer, formerly with the Lebanon Valley Iron Co., Lebanon, Pa., has been made assistant manager of the Pittsburgh office of Luria Brothers & Co.

David L. Wilkoff, formerly manager of the Pittsburgh office of Luria Brothers & Co., has resigned, and will become a member of a new concern to be known as the Wilkoff-Stein Co., dealer in old material, and which

will open offices in the First National Bank Building, Pittsburgh, about Dec. 15.

H. C. Gable, formerly general sales agent of the American Iron & Steel Mfg. Co., Lebanon, Pa., (now a part of the Bethlehem Steel Co.), and until recently associated in a consulting and advisory capacity with a group of New York capitalists, has with H. T. Gerdes, Gerdes & Co., manufacturing and contracting engineers, New York, organized the Atlantic Steel Corporation, with offices at 30 Church Street, New York. The company intends to buy and sell steel in such forms as bars, sheets, plates, bolts, nuts and tin plate. It is already engaged in business, although time has not yet allowed for the granting of the charter for which application has been made at Albany.

G. F. Matteson, who has specialized for some years in munitions manufacture, part of the time at the Frankford Arsenal in Philadelphia, and more recently in a consulting capacity for different munition manufacturers, has been appointed department superintendent at the Watertown Arsenal, Watertown, Mass.

David O. Holbrook, Pittsburgh secretary of the National Gas Association of America, has been named to direct the distribution of natural gas for industrial purposes in the United States in connection with the priority committee and the War Industries Board. His work will be to see that munition factories get preferential service by gas companies. Mr. Holbrook will spend three days a week in offices to be opened for him in the Council of National Defense Building in Washington. His Pittsburgh offices are in the Oliver Building.

Frank H. Hitchcock, postmaster general of the United States in President Taft's cabinet, has been made president of the Vulcan Steel Products Co., 120 Broadway, New York, succeeding Otto Kafka, who resigned on Nov. 15. Gen. T. Coleman du Pont assumed control of the company on Aug. 1. G. A. Callanen, formerly with the Allis-Chalmers Mfg. Co. and the Westinghouse Electric & Mfg. Co., has been appointed head of the machinery and engineering division; R. D. Chipp, formerly purchasing agent of the Brazil Railways, is assistant to the president, and F. M. Welsh, formerly identified with the Republic Iron & Steel Co., at Pittsburgh, has been appointed assistant purchasing agent.

S. L. Naphthaly, manager of the Los Angeles Shipbuilding & Dry Dock Co., has just returned from the East, where he bought a number of machines for his plant. This corporation has contracts for eighteen 8800-ton vessels.

John A. McGregor, Pacific Coast representative of the Bethlehem Shipbuilding Corporation, has returned from a three months' visit to the East. Mr. McGregor says that extensions, the nature of which cannot at present be disclosed, will be made in the Union Iron Works at San Francisco.

H. M. Lane of the H. M. Lane Co., Detroit, addressed the Associated Foundry Foremen of New York and vicinity on "The Relation Between Economical Production of Castings and Foundry Design," at the meeting of the association held Dec. 8 at the Hotel Chelsea, New York.

Charles T. Bragg will become works manager of the Michigan Smelting & Refining Co., Detroit, Jan. 1. He was chemical engineer of the Ohio Brass Co., Mansfield, Ohio, for six years, and for four years technical director for Berry Bros., Detroit. He is the past president of the Detroit Section of the American Chemical Society.

Howard Emery, general manager of the Manitowoc, Wis., foundries of the Aluminum Castings Co., Cleveland, for several years, has been notified of his promotion to the position of general manager of the company's works at Detroit, effective Jan. 1. His successor at Manitowoc has not been named.

C. B. Krueger, sales manager Stamping & Tool Co., La Crosse, Wis., for the last two years, has resigned to engage in another line of work at Keokuk, Iowa.

A. H. Jameson, now connected with the Malleable

Iron Fittings Co., Branford, Conn., has been elected vice-president and general manager of the Bayonne Steel Casting Co., Bayonne, N. J., and will assume the duties of his new office Jan. 1.

L. B. Moses has become connected with the Walter A. Zelnicker Supply Co., St. Louis. Mr. Moses joins the Zelnicker organization as second vice-president, in charge of the rail department, with headquarters at the company's main offices in St. Louis. He has been associated with the rail trade since 1903, when he resigned as assistant to the president of the Kansas City Southern Railway. Since 1911 he has been sales manager of the Kettle River Co., Minneapolis.

G. A. Schneider, formerly of the Western Electric Co.'s San Francisco sales organization, has been appointed manager at Buffalo, succeeding J. W. Tabb, who has been transferred to the New York office.

David F. Noble has resigned from the E. L. Essley Machinery Co., Chicago, and associated himself with the David W. Wright Machinery & Equipment Co., Chicago.

Harry H. Pinney, vice-president in charge of the Remington Bridgeport Works, Remington Arms-U. M. C. Co., has been granted an indefinite leave of absence and will shortly go to California to recuperate after two years of arduous but successful work to put the big rifle plant on a paying basis.

Readjustments of Freight Rates in Central Territory

WASHINGTON, Dec. 11.—Shippers of iron and steel articles over the rails of the Buffalo, Rochester & Pittsburgh Railroad, either as an originating or a delivering carrier, will not remain on the old basis of rates, although that carrier was not mentioned in the blanket fifteenth section order of the Interstate Commerce Commission, issued Nov. 15, authorizing the railroads in Central Freight Association territory and carriers taking iron and steel articles into or out of that district to readjust their rates in accordance with its decisions in the Central Freight Association class scale case. A special permit has been issued in behalf of that railroad authorizing it to bring its rates up to the new fifth class basis. Its name was unintentionally left off a list sent to the commission by the tariff filing agent of the Central Freight Association lines.

The Baltimore & Ohio, Chesapeake & Ohio, Norfolk & Western, and Detroit, Toledo & Ironton railroads have been specifically authorized to publish rates from Ohio River crossings on iron and steel on the basis allowed in the Central Freight Association class scale case, namely, fifth in carloads and fourth in less than carloads. The object is to put the Ashland-Ironton group on as high a level as Youngstown. That shipping point, owing to the commission's decision in the Pollak iron and steel case, had to be raised because the carriers elected to raise the Cleveland and Youngstown level rather than bring Chicago and Cincinnati down so that the rates from those markets would bear the same relation, on iron and steel, to rates from Pittsburgh, that rates on commodities, other than iron and steel, bear to the New York-Chicago scale.

Rates from the Portsmouth and Ashland-Ironton groups have been made on the basis of observing the rates from Youngstown to points on and west of the Hocking Valley rails, as maxima.

The International Trade Press, Inc., Monadnock Block, Chicago, announces that it has purchased the Cement Era Publishing Co. and that the *Cement World*, the *Cement Era* and *International Trade* will be consolidated in the *Engineering and Cement World* which will appear semi-monthly beginning Jan. 1. C. A. Tupper is president and treasurer of the purchasing company.

The Huntington Steel Products Co., Huntington, W. Va., is considering enlarging its plant.

OBITUARY

DAVIS S. MATHIAS, consulting superintendent of the south works plant, Illinois Steel Co., died at his home in Chicago, Dec. 5, after a short illness, aged 73 years. He was a native of Wales and from the age of 12 until his death was actively connected with the steel business, starting at South Works in 1884. He became superintendent of the rail mill, then general superintendent and more lately consulting superintendent, although virtually on the retired list. Mr. Mathias was recognized by all steel men as an expert authority on the making of steel and especially in the designing and operation of rolling mills. He was a member of the American Iron and Steel Institute, a director of the South Chicago Savings Bank, a member of the Old Settlers' Association, a local organization, of Calumet Commandery No. 62 Knight Templars, the Sinai Chapter 185 R. A. M. and other Masonic bodies. He leaves a widow, two daughters and three sons. The sons are all engaged in the steel business. David R. is general superintendent of the Joliet works of the Illinois Steel Co., William G. is general superintendent of the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala., and Thomas H. is assistant general superintendent of the Lackawanna Steel Co., Buffalo. Mr. Mathias was a man much loved by all who knew him and his death caused deep regret. The funeral Dec. 7 was attended by a large number of both his older and younger associates.

FREDERICK E. SAWARD, editor and publisher of the *Coal Trade Journal*, New York, died Dec. 4, aged 71 years. As a youth Mr. Saward was identified with the coal trade of New York and continued in that connection until he conceived the idea of a trade journal devoted to coal. He founded the paper 48 years ago and has conducted it ever since, for 40 years publishing an annual statistical review of the coal trade of the United States. At the Paris Exposition in 1900 he directed the preparation of the American coal exhibit. He had served one term as president of the New York Trade Press Association. His son F. W. Saward has been for some years general manager of the *Coal Trade Journal*.

THOMAS EVANS, Lebanon, Pa., died at his home in that city on Dec. 2, at the age of 86 years. In 1881 he founded the Lebanon Rolling Mills, retiring in 1901. Prior to that, in 1859, he established the first iron mill at Shelby, Ala., which also was first in that State. During the Civil War he engaged at Newport, Ky., in charge of steel production for United States monitors used during the war. He leaves a widow.

SIMON FLORSHEIM, chairman of the board of directors of the Independent Pneumatic Tool Co., Chicago, and president Aurora Automatic Machinery Co., died Dec. 7, aged 80 years. He leaves a widow, a daughter and four sons. Mr. Florsheim was a native of Germany.

The Last Pig Iron Warrant

Recently the American Pig Iron Storage Warrant Co., New York, canceled its last warrant calling for iron in store on furnace yards. Commenting on this fact the Matthew Addy Co., Cincinnati, says: "This means that the reserve stock of iron piled for a rainy day has been exhausted and the country is now dependent for the iron it uses on the day by day output of the furnaces. It is a serious situation, for never was there such an absolute need of iron. And the worst of it is that there is no remedy. We have no other way now of providing for the enormously increased uses of iron than by speeding up the furnaces to their utmost capacity. This is easily said. But saying and doing are two different things. And instead of speeding up, the furnaces have been compelled to slow down; this because of the transportation, labor and coke shortages. There is no prospect of an early termination of these troubles. On the contrary, the winter weather will probably intensify them."

Broader Field for Export Organizations

They Must Be Able to Design and Equip Complete Manufacturing Plants Abroad—How New Demands of Foreign Buyers Are to Be Met

BY G. A. HARRIS*

MANY articles have appeared in the public press covering export trade expansion. They have dwelt mainly upon the desirability of developing this business, but the suggestions made have been more or less vague.

At the beginning of the war, the European countries did not have the time or inclination to plan for after-war conditions, as their efforts were of necessity confined to war preparations and to meeting the abnormal conditions with which they were confronted. It is only recently that they have begun to think of the future and these requirements. European nations, both Allies and neutrals, are now beginning to realize that they must call upon the United States for a large portion of their wants, especially for machinery and industrial plants. They are further beginning to realize that it is advisable for them to modify their specifications and requirements to conform as far as possible to the United States standards; otherwise, American makers would be compelled to develop special patterns, tools, etc., and train their workmen on new products, entailing longer deliveries and high or prohibitive prices.

Now that the foreign buyer is disposed to modify his requirements and specifications to conform to American standards, it becomes necessary for him to familiarize himself with these standards. The logical way of doing this is to send inquiries to this country for the material or equipment desired with the expectation of receiving proposals and specifications on standard American equipment which will furnish the information he requires. Of course, it is appreciated that in certain cases special specifications and designs will have to be met so as to turn out products or commodities peculiar to the country to which the machinery or equipment is to be shipped. This may necessitate departures from American standard practice, a condition American makers must of necessity meet. In other words, a spirit of co-operation and a desire to meet each other half way must prevail.

Treatment of War-Time Inquiries

Inquiries are now being received from practically all foreign countries covering various types of equipment and these are coming at a time when American manufacturers are overburdened with orders for standard equipment that can be put through their plants with a minimum amount of trouble. At first glance these inquiries from abroad do not appeal to the average manufacturer because of the special requirements involved, and the inclination is to reply that it is impossible to quote because of the great amount of work on hand and the impossibility of making earlier deliveries, etc. This is a typical reply from American manufacturers nowadays. But is it a wise reply?

In many cases, the object of these inquiries is not to obtain a firm price and an absolute delivery, because conditions existing prohibit the placing of the business immediately, rather to obtain specifications, drawings and other data, to enable the foreign buyer to familiarize himself with American equipment and standards, and to get a rough idea of costs and deliveries, so that when conditions will allow him to place the business, he is in the position to draw up his final inquiry or specification to conform with American standards.

True, it is difficult under existing conditions for a manufacturer whose desk is covered with emergency orders to push these aside and devote his time to the details of proposals and specifications covering equip-

ment that he does not hope to realize on for some time to come, but he must do this missionary work in the light of insurance against future falling off of home trade.

Many of these foreign buyers have been dealing heretofore with Germany and have become accustomed to German methods and service, which were of a high order. America, therefore, if it expects not only to obtain this business but afterward to hold it, must furnish a service equal if not superior to that which Germany has supplied.

Naming Prices for Foreign Delivery

Let us look at the matter, first, from the foreign buyer's point of view—one which every successful exporter must train himself to adopt. The foreign buyer who wants to buy or manufacture something is interested primarily in the cost of the article or plant delivered ready to operate at its final destination; the costs in America, either at works or at seaboard, are merely incidental. Therefore, in normal times, the first essential on the part of the American manufacturer is that he be able to present his offer to the foreign buyer covering the cost of equipment at destination. It is also naturally desirable that his proposition be presented to the prospective customer or buyer in the buyer's language. This means that the proposal, blueprints, catalogues, specifications, etc., should be submitted in the language of the buyer. The average American manufacturer is not in a position to do this.

The result in the past has been that a majority of American manufacturers have quoted f.o.b. cars at works or f.o.b. steamer at some American seaport, they have submitted their quotations, specifications, drawings and other exhibits in English, and, in many cases, have not given shipping specifications or data so that if the customer were able, he has not sufficient information to figure out what it would cost to get the material to him. This has been one of the big faults in the past of the American manufacturer and something that must absolutely be overcome and corrected if we are to be successful in the future.

Going a little further into the matter and assuming that business has been placed and the manufacturer has been given orders for certain equipment. The foreign buyer usually has special requirements covering packing, marking, invoicing and the making up of certain documents which, to many manufacturers, seem entirely unnecessary, extremely complicated and not worth the trouble. Hence, in very many cases in the past, these instructions have not been carefully followed or have not been followed at all, resulting in the equipment arriving at destination in poor condition or incorrectly marked and the papers arriving incorrect or late, entailing untold trouble and dissatisfaction on the part of the foreign buyer.

Contracting for Plants Complete

Let us consider the case of the foreign buyer who is in the market for industrial plants of various kinds, especially where he wishes to manufacture a commodity which requires equipment and machinery from various manufacturers. In Germany, a large number of manufacturers of certain classes of machinery were willing, in order to sell their equipment, to design the complete plant, contract for and furnish the complete equipment, buying such machinery or equipment that they did not make themselves from other makers, but eventually delivering to their customer the complete plant ready for operation. If we are to obtain this business and hold it, similar service must be offered and rendered.

*Chief engineer American Steel Export Co., Woolworth Building, New York.

The average American manufacturer does not want to contract for a complete plant or equipment of which his own forms only a part, and to a certain extent his position is a correct one.

Here is our opportunity to meet the German system and improve upon it. Here is the opportunity for an organization to be developed through which the various manufacturers whose equipments enter into a plant of this kind can work, so that a proposition can be made on the complete plant, the same as the Germans did, not by a manufacturer who is interested in only part of the plant, but by a central organization that is interested in the entire unit. This calls for organizations that are thoroughly equipped to handle this situation.

An Outline of Organization

The essential features of such an organization should be as follows:

First, a thorough knowledge of the export business and the customs. It must contain in its organization trained export men who are capable of looking at matters from the foreign customer's point of view, who will study his interests and present his proposition in a clear manner to the manufacturer, and educate the latter to endeavor to meet the foreign buyer's desires. The organization must have men who are familiar with the packing requirements of the various foreign countries; who understand the importance of proper marking; who can advise the manufacturer how to assemble machinery and pack it to minimize ocean freight and to insure safe arrival at destination; who can make out the documents to conform with the various requirements and who can satisfactorily and efficiently attend to the many other export details.

The organization must contain, in addition, a high grade technical corps—specialists in the various classes of machinery or equipment which are being handled, who can intelligently take the offer of the various manufacturers, f.o.b. cars at works, and expand and develop it, adding various other details which go to make it a complete offer for delivery at destination. There should be men capable of receiving an inquiry for a complete plant and dividing it up at this end among the various manufacturers; laying out the complete plant if necessary; drawing up the specifications to the various manufacturers so that the different parts will fit and properly work together; supplying any missing links; presenting to the various manufacturers inquiries which will develop proposals of a nature that will satisfy the special wants of the buyer.

The organization should be able to estimate upon the ocean freight and other delivery charges to destination and if necessary the erection costs, so that finally it is able to make an offer on the plant complete and, if necessary, erected at destination.

There is a great advantage in the way outlined over that of Germany where the manufacturer designed and laid out the plant in order to sell his portion of the machinery and naturally favored his own part, while the remainder received minor consideration. On the other hand the organization described is not interested in any particular make of machinery but designs the plant in accordance with the best practice and the requirements of the country or customer for whom it is intended. The result is an all-around efficient plant rather than a one-sided plant.

Manufacturers' Co-operation

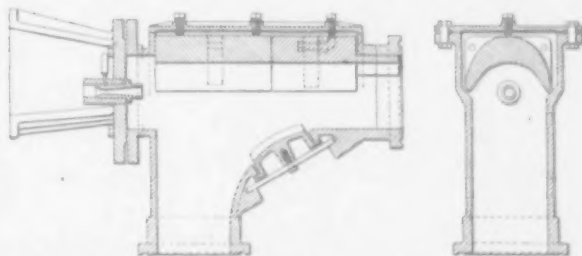
A number of our large manufacturing companies have their own export departments in which they have endeavored to meet as far as possible the above ideas of an export organization, but only a few have sufficient business to warrant such a department. Most of our manufacturers must look to an independent organization such as described above. A number of such organizations have been formed and in the short time they have been operating the results have proved conclusively the correctness of the idea. The manner in which their story has been received in foreign countries shows how badly they are needed. However, they cannot be as successful as they should be without the hearty co-operation and backing of the manufacturers. To a certain extent they are fighting the battle of the

manufacturers and the sooner the latter appreciate this and give their hearty support and co-operation, the sooner will our foreign relations and trade be understood and established.

Steam-Jet Ash Conveyor

A steam-jet ash conveyor is a recent production of George J. Hagan Co., furnace and combustion engineer, Pittsburgh. In connection with this conveyor system is used the patented signal elbow shown in the illustration. Ashes are conveyed by air drawn in by the velocity of the steam from the steam nozzle. This nozzle is equipped with a whistle which is blown when wear of 1/16 in. at the nozzle's throat takes place, thereby indicating that the nozzle should be replaced. By this means, it is pointed out, approximately constant steam consumption is maintained. A special flared air intake is used, which the company claims allows 98 per cent of the theoretically determined amount of air to pass through the pipe, contrasting this to an ordinary pipe opening for which he says this factor is 62 per cent.

The signal elbow has a two-piece wearing back. The lower half of this is reversible, while the upper half has a lip extension protecting the pipe joint. The elbow flange which rests on a pedestal base and the flange of the pedestal base are faced and drilled to insure self-centering and aligning of the steam nozzle.



The Signal Elbow Stands Upright on the Pedestal Base Containing the Steam Nozzle. The lower half of its two piece wearing back is reversible. The nozzle has a whistle which is blown when wear of 1/16 in. occurs at the throat.

The elbow may be swung to clear obstructions and access to inside parts is obtained by removing the hand hole plug and rear cover plate.

When auxiliary steam-jet fittings are required in a straight run of pipe converging signal nozzles are used to centralize the flow of ashes and prevent undue wear on each side of the pipe. Also, elbows are provided with reversible wearing backs and with hand hole plugs for inspection.

Steel Ingot Output in November

Returns from 29 companies, which in 1916 made 88.14 per cent of the steel ingot production of the United States, have been compiled by the American Iron and Steel Institute, and based on these the estimate is made that steel ingot production in November was 3,166,257 gross tons, against 3,351,935 tons in October. There were 27 working days in October, making the daily average in that month 124,146 tons, while in the 25 working days in November it was 126,650 tons. As with pig iron, the daily output of ingots in November averaged slightly above that in October, contrary to the general belief. The institute figures, in gross tons, for the two months named, also for the first half of the year and for the third quarter, are as follows:

	Total First Six Months.	Third Quarter, July-Sept.	October,	November.	Total Eleven Months.
Open -					
hearth ..	13,681,483	6,599,048	2,475,754	2,384,218	25,140,503
Bessemer ..	5,164,139	2,411,108	870,494	772,489	9,218,230
Other	55,198	24,435	5,687	9,550	94,870
Total ..	18,900,820	9,034,591	3,351,935	3,166,257	34,453,603

The American Iron and Steel Institute continues its estimate, made in October, of a total steel ingot output for the United States in 1917 of 42,600,000 gross tons.

RUSHING NEW CONSTRUCTION

Youngstown Sheet & Tube Co. Salesmen Inspect Plant—Successful Meeting

One of the most successful sales conferences in the history of the Youngstown Sheet & Tube Co. was held in its home offices in Youngstown, Ohio, Tuesday and Wednesday of last week, Dec. 4 and 5. About 40 salesmen and managers of branch offices were present, one or more from each district. Tuesday, the salesmen, under guidance of J. A. Campbell, president; W. C. Reilly, general superintendent; R. J. Kaylor, publicity manager, and other officials, were taken through the works and given an opportunity to see the immense amount of new construction in progress, and also to note the rapid work that is being done in the construction of the new 120-in. plate mill, which is being built for the company by the Mesta Machine Co., Pittsburgh, and which is being rushed as fast as possible to supply plates for the Government, which are so badly needed at this time. The salesmen were especially interested in the production of shell steel, large quantities of which are being turned out by this company for the Government. Other extensions that are nearly completed were also inspected, and some time was spent in the tube mills, and also in the new 9-in. and 12-in. steel bar mills erected at Struthers, Ohio, for the company by the Morgan Construction Co., of Worcester, Mass. An illustrated description of the 9-in. mill appeared in THE IRON AGE, issue of April 5, 1917, and of the 12-in. mill in the issue of Oct. 11, 1917. Both these mills are now running on heavy Government orders.

First Liberty Loan

May, 1917

Subscriptions to loan by company	\$3,275,000.00	
Subscriptions to certificates of indebtedness, issued Aug. 10, 1917, by company	2,000,000.00	
Subscriptions to loan by employees	581,000.00	
Total for First Liberty Loan		\$5,856,000.00

National Red Cross Campaign

June, 1917

Company's subscription to Red Cross Fund	\$100,000.00	
Subscription by employees (all departments)	55,368.00	
Total subscription to fund		\$155,368.00

Second Liberty Loan

Oct. 18-24, 1917

Subscriptions to loan by company	\$2,375,000.00	
Subscriptions to Government certificates by company	5,000,000.00	
Subscriptions to loan by employees	1,065,000.00	
Total for Second Loan		\$8,440,000.00

Y. M. C. A.—War Work Fund

Nov. 12-15, 1917

Subscription by the company	\$10,000.00	
Subscriptions by employees	20,479.43	
Total subscriptions		\$30,479.43
Appropriated for Sheet & Tube ward in Paris Hospital	\$6,000.00	
Total of all subscriptions		\$14,487,847.43

Men in Service

Number of men in Naval and Military Service (estimated)	800
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Luncheon was served in the works office restaurant, and some time devoted to seeing pictures showing many operations in the works, as well as the extensive welfare and safety work being done, including the erection of several hundred modern homes for workmen. The evening was devoted to a dinner, at which addresses were made by a number of the executives and others. The feature of these addresses was the disclosure of the activities of the company in the matter of furnishing steel to the Government and the Allies for war purposes, as well as in subscriptions to Liberty bonds and other movements connected with war work. It was shown that the corporation and its employees have invested in these funds the astonishing total of almost \$15,000,000. The fact was also brought out that the extensions completed and begun during the present year, largely for the purpose of increasing the output of projectile steel and meeting other Government requirements, will involve the expenditure of approximately

\$16,000,000. Wednesday was devoted entirely to discussion of sales problems in which, under the leadership of W. E. Manning, vice-president and general manager of sales, and Walter E. Watson, assistant manager of sales, almost all the salesmen and heads of departments participated. These problems concerned chiefly such a distribution of the company's products as will best serve its customers, under the policy which gives to Government orders priority over all others.

A dinner at the Hotel Ohio closed the conference, which was declared to be the most interesting and helpful the visiting salesmen had ever attended. A statement of the record of activities of the Youngstown Sheet & Tube Co., in war subscriptions and donations up to Dec. 1, 1917, is presented in the accompanying table.

Increased Activity in Metal Working Lines in Canada

TORONTO, ONT., Dec. 11.—The British Government has instructed the Imperial Munitions Board, Ottawa, to issue without delay, to Canadian metal working plants, equipped for the work, contracts in volume covering the steel, forging and machining of 18-lb. shrapnel, 4.5-in. and 6-in. high explosive shells, which will insure steady employment both for men and machines for a period extending well into the new year. Munitions making in Canada has been for several months ebbing, and until recently had the appearance of becoming a negligible quantity. Realization of such a possibility was little relished by our business interests. Investigation of the position disclosed the fact that financing of munitions orders was the chief obstacle in the way, hence efforts were at once directed to satisfactorily overcoming the trouble. Canada's great Victory Loan was closed Dec. 2, in which upward of \$410,000,000 was subscribed by the people of the Dominion. This money will be spent in Canada on war munitions, supplies, etc. The decision to place further large shell orders in Canada, coming as it does in the wake of the distribution of large contracts from the United States Government for 75 and 155-mm. shells; the placing of huge contracts for fabricated steel for American ship construction, and the receipt by a Toronto firm of a contract to supply aeroplane engines to the value of some \$5,000,000 to the Imperial Government, it may be said that at no period in the Canadian industrial history has the business outlook in the metal trades been so promising.

British Steel Exports to France

Iron and steel exports from Great Britain to France, according to *L'Usine*, for the first seven months of 1915, 1916 and 1917 have been as follows respectively: 1,795,163 metric tons, 2,138,853 tons and 1,491,785 tons. The largest movement in any of the three periods was 389,740 tons in May, 1916. The peak was evidently reached in 1916.

The Eastern Steel Co., New Glasgow, N. S., is in liquidation, proceedings having started under judgments obtained by a number of creditors. Half of the plant was destroyed by fire a short time ago. It is understood that the bondholders of the company were prepared to furnish funds to enable it to proceed in business if they could obtain assurance that orders for shells would be forthcoming. They could have obtained orders from the American Government at a paying figure, but the Imperial Munitions Board intervened. As the company had been engaged in machining 4.5-in. shells previous to the fire, it is highly probable that the Imperial Munitions Board will place some of the orders now available with it.

The "Preparation of Ferrouanium" is the title of Technical Paper 177 of the U. S. Bureau of Mines by H. W. Gillett and E. L. Mack. It is a part of the investigations of the bureau relating to radium, uranium and vanadium, and the results are presented in the belief that they will be of aid in developing the use of this alloy in the manufacture of special steels.

HIGHER LIGHTERAGE CHARGES

New Schedule at New York Approved by Interstate Commerce Commission

WASHINGTON, Dec. 11.—Proposed increased charges for delivering heavy articles, chiefly structural iron and steel, by lighter at New York are justified in an opinion by the Interstate Commerce Commission, vacating the order by which a new schedule was suspended until Dec. 15, 1917. The result of the decision will be to subject to an additional charge of 40 cents per ton for lighterage delivery pieces weighing from three to 20 tons which constitute a large percentage of the shipments of structural iron and steel to New York and vicinity.

What is known as the New York rate group embraces not only the city of New York, but the northern part of the state of New Jersey, points along the Hudson River almost as far north as Albany, N. Y., and points on Long Island as far as Jamaica. As a general rule, the rail carriers serving this territory will deliver freight at any point in the rate group without imposing any charges in addition to the New York rates. Because of the peculiar terminal conditions at New York it is necessary for the railroads serving the port to employ lighters and car floats in transferring freight from their terminals to the various points of delivery along the shore of the harbor. With certain important exceptions, delivery by lighter or car float is made without any additional cost to the shipper. The rail carriers own and operate lighters and car floats, but not in sufficient numbers to handle all the tonnage offered, and it is their practice to employ independent lighterage companies commonly referred to as "outside companies," to deliver part of the traffic. For delivering the general run of lighterage traffic, the outside companies have for years received from the rail carriers a published allowance for this service, usually 60 cents per ton, and the eastern carriers deduct that amount from the through rates to cover the terminal service before prorating with their western connections.

The Extra Charges

The extra charges at present imposed upon shippers for the lighterage delivery of articles weighing more than three tons are as follows: Pieces weighing from 3 to 20 tons, 40 cents per ton; from 20 to 30 tons, 65 cents; from 30 to 35 tons, \$1.15; from 35 to 40 tons, \$1.90; from 40 to 45 tons, \$2.40; and from 45 to 50 tons, \$2.90. These charges are superimposed upon the New York rates.

Under the terms of the suspended tariff the 65 cent rate is raised to \$1.40, the \$1.15 rate to \$1.40 and the \$2.40 rate to \$2.90, while the \$1.90 rate is reduced to \$1.40.

The protestants have finally agreed to accept the new rates but have objected strongly to the cancellation of the following exception in the present tariff:

An Important Exception

"When a lighterage order from one shipper or consignee covers delivery of 50 tons or more at one time from one harbor point for one harbor destination, or when the freight charges on a shipment from one shipper to one consignee are assessed on a minimum of 50 tons, no extra charge will be made for single pieces weighing 20 tons or less; otherwise the foregoing rates will apply."

By virtue of the above exception shipments of structural iron and steel to New York which are almost invariably made in lots of more than 50 tons to one consignee, the individual pieces weighing less than 20 tons, have escaped payment of all extra charges. The cancellation of the exception would subject shipments of these commodities, regardless of the quantity offered, to the additional charge prescribed in the tariff of 40 cents per ton for the lighterage delivery of pieces weighing from 3 to 20 tons. The proposed tariff makes no change in this 40-cent charge, but applies it uni-

formly by canceling the exception regardless of the size of the shipment.

Elimination Justified

After full investigation the commission holds that the proposed elimination of the exception is justified and makes a significant observation concerning the absorption of a part of the cost of lighterage out of the transportation rates, saying:

"Not even the protestants contend that the lighterage service can be performed at a cost even approximately as low as that figure. In addition to this sum, there is paid to the outside companies the additional sum of 60 cents absorbed by the respondents out of the New York rates, making the total allowance \$1 per ton. Inasmuch as this allowance is now being paid by several of the respondents, they are now absorbing \$1 per ton on all traffic to which the exception applies. The respondents ask, in effect, that they be required to absorb only 60 cents of the allowance, and that 40 cents be borne by the shippers. The protestants ask, on the other hand, that the whole allowance of \$1 be borne by the rail carriers. In the light of the evidence of record in this proceeding the conclusion cannot be reached that this whole burden should fall upon the respondents, nor can it properly be contended that the carriers are unreasonable in asking the shipping public to bear 40 per cent of the terminal cost. This statement is not to be interpreted as meaning that it is incumbent upon the respondents to continue the absorption of 60 cents per ton out of the transportation rates, for that question is not presented for determination upon this record."

Experienced observers of the work of the commission see in the closing sentence above quoted a suggestion to the carriers to place upon the shippers at least a part of the 60 cents per ton now absorbed by the railroads.

Larger British Output of Basic Pig Iron

The imperative need of making the best use of native British iron ores has resulted in a notable change in steel manufacture in that country, says the *Engineer*. Before the war the output of acid steel, Bessemer and open-hearth was about twice as great as that of basic steel—4,860,000 tons against 2,800,000 tons; but now in order that the poor and phosphoric ores may not be wasted, furnaces have been turned on to basic. To meet this change the Stanton Iron Works Co., Ltd., not long since relined two of its blast furnaces with basic material, and on Oct. 20 lighted up a third, so that now three out of the nine blast furnaces, each with a capacity of about 300 tons per week, is making basic pig largely from local ores but with the addition of a small quantity of manganese ore. The company employs about 1000 men at its iron mines.

India's Manganese Ore Output

Manganese ore output in India in 1916 was 50.20 per cent greater than in 1915, or 568,032 tons against 378,172 tons in 1915. The shortage of ship tonnage was to some extent relieved by special arrangements for shipment. Prices continued to advance and the average per unit was 2s. 5¼d.

The Milwaukee branch of the National Association of Sheet Metal Contractors of the United States has elected the following officers: President, John Bogenberger, vice-president Consolidated Sheet Metal Works. vice-president, E. B. Tonnsen, president-treasurer E. B. Tonnsen Co.; secretary, O. A. Hoffmann, secretary-treasurer Biersach & Niedermeyer Co.; treasurer, J. M. Hollits, of Hollits & Bogenberger. The association will entertain the fourteenth annual convention of the national body in Milwaukee in June, 1918.

"Iron Ore Occurrences in Canada" is the title of a new publication, in two volumes, by the Canadian Department of Mines. It is compiled by E. Lindeman and L. L. Bolton.

Mechanical Engineers Discuss War Work

(Continued from page 1427)

action. Definite rules were essential and if they are enforced impartially, the women will obey almost any rule. He showed pictures to indicate how in the Wagner plant machinery is painted a white enamel, which makes for cheerfulness of the surroundings and helps to maintain a generally clean condition. Efficiency, he said, was very much dependent on the mental attitude and this was helped by the surroundings with the added fact that women have a decorative instinct. His investigations led him to believe that there is no relation between wages and morality, but instead that immorality was found where there was too great clothes consciousness, in which case the work was not of a high class. He urged the use of a uniformity of apparel in the shop, though giving some chance for individuality. He favored for the material something with an unfadable blue. The uniform includes a waist of identical design for all women. The operatives are given an option as to wearing these on Saturday, partly as a recognition of the Saturday half holiday for which they may be prepared before coming to work. Only girls who are somewhat masculine don overalls and these he regarded as a dangerous element in that they lack sex consciousness.

John W. Higgins, president and treasurer Worcester Pressed Steel Co., Worcester, Mass., told how women are engaged in press work in the manufacture of cartridge cases and helmets and do gaging and assembling work. He advocated the establishment of classes for girls in trade schools.

L. W. Wallace told of the employment of women in the plant of the Diamond Chain & Mfg. Co. Of the employees, 30 per cent are now women, and they are doing all forms of machine work. They are now engaged in the engineering department, a woman has charge of the bonus department and a university graduate is engaged in the cost department. The plan is to put a woman to interview all men for employment as well as women. A woman university graduate has been engaged as director of mutual service, as the position is termed, and her job is to direct discipline, consider disputes and pass on discharges. Men and women are working together, but with a general scheme of control, and the company is having no trouble in attracting high types of young womanhood.

Arthur C. Jackson, general superintendent Miller Lock Co., Philadelphia, said that at its works 42 per cent of the employees were now women. They were engaged among other things in the cost department and on payroll work. He emphasized the desirability of a trained nurse as the most effective means of communication between employer and employee. A matron is on duty in every toilet as a controller, if nothing more, of the language or conversation. The women are engaged on drill presses and on milling work and all the milling of keys is done by women.

E. J. Poole, Carpenter Steel Co., Reading, Pa., advised on the mixing up of nationalities and suggested also the need of larger lockers for women employees. He finds exceedingly good work by women in grinding.

Business Session

The address by the retiring president, Ira N. Hollis, on "The Activities of the Society for 1917" was presented at the business meeting on Thursday morning. Among the points touched upon were the increasing part played by the society in State and national affairs at the present time, with particular reference to the adoption of the boiler code by a large number of States and cities and the progress that was being made toward its adoption by the remaining ones. The influence of the power test code on the design of power stations was also mentioned. The time had come, he believed, for the society to establish commercial standards in the mechanical engineering field the same as the Society of Automotive Engineers had done for the automobile industry. At the present time, Dr. Hollis stated, 10 per cent of the membership of the society was in active

service and a number of others were giving their services in connection with different committees and boards of the Government.

A number of amendments to the constitution were presented by F. R. Hutton, chairman of the committee on the constitution and by-laws. These related to changes in the personnel of the council and also in the policy of the society to permit subjects of public interest to be discussed at the meetings and the approval of standards by the society. These were ordered to be submitted to the membership by letter-ballot in the customary way.

Walter M. McFarland, Babcock & Wilcox Co., New York, presented a bust of the late Rear Admiral Benjamin F. Isherwood, U. S. N., to the society. This was a gift of a number of members who had been associated with the admiral in the naval service and was unveiled by a grandson and namesake.

Cockerill and Other Belgian Steel Plants Dismantled

Nearly the entire plant of the famous Cockerill Works, at Seraing, Belgium, has been destroyed or confiscated, according to a statement of Reuter's Agency based on a Belgian source. The destruction of works in the Liège district is being completed. Gangs of men have been put on to destroy the Cockerill blast furnaces. Besides this, all the machinery has been taken away as well as all raw materials and stocks, and the central works are being taken to pieces in order to remove all the copper from them. At Ougrée preparations have been made to pull down three blast furnaces; two are already destroyed. Seven rolling mills out of nine have been removed. At Angleur everything has disappeared. At Grivegnée everything has gone except the steel works, where the Germans are making ingots. At the Espérance works at Longdoz, as soon as the first requisition papers arrived, the Germans immediately began to destroy or to take away the blast furnaces, steel works, rolling mills, foundry and machine shops. Everywhere the Germans are taking away the papers and plans from the drawing offices. The situation is practically the same all over the country. The important works of La Providence at Haumont, province of Hainaut have been completely destroyed, as well as the power station of the same firm at Marchienne.

Manganiferous Ores in New Mexico for Spiegel

Over 31,000 gross tons of manganiferous iron ore has been shipped from mines near Silver City, N. M., since April, 1916. The ore averages about 16 per cent manganese, 35 per cent iron, 6 per cent silica and 0.012 per cent phosphorus, and has been sent to the Colorado Fuel & Iron Co., at Pueblo, Col., for conversion into spiegeleisen. Dr. J. B. Umpleby of the U. S. Geological Survey in a report says that "in this district there are more than 500,000 tons of ore available, apparently of a grade similar to that already shipped from the area. It is apparent that a very large quantity of ore suitable for spiegeleisen can easily be developed in the Silver City area."

The Algoma Steel Corporation, Sault Ste. Marie, Ont., will make considerable additions and improvements to its plant, including the installation of 25 by-product coke ovens, with by-product equipment. Construction will be started immediately and it is expected that the plant will be completed by the middle of 1918. The contract for the installation of the coke ovens has been awarded to the Wilputte Coke Oven Corporation, New York.

The Edison Supply, United States Navy, 1218 Edison Building, Chicago, is constantly in the market for engineers' mill and contractors' supplies, building hardware and tools for use in the naval training station, Great Lakes, Ill. Among the articles to be purchased are steel, nails, screws, wire rope, sheet metal, bolts, rivets, saws, files and welding apparatus.

Machinery Markets and News of the Works

MORE PLANTS ON WAR WORK

Conversion of Several Industries Beginning

New Demand for Machine Tools Shows Somewhat of a Falling Off in All Markets, Though Small-Lot Business Continues Fairly Good

Conversion of factories in various industrial lines to war work constitutes one of the interesting features of new machine-tool demand. While as yet none of these new war contractors has appeared as a large buyer, there is a fair inquiry for small lots of tools. It is probable that no very large demand will come from this source, as companies are bidding on such work as they can do with their present equipment.

Perhaps the greatest transition is to be noted in the automobile industry. Detroit plants are being rapidly converted into war material producers. Among Government orders placed there during the past week was one for 50,000 mine anchors, which was divided among several automobile makers. An Akron, Ohio, tire manufacturer is reported to have taken an order for 450,000 gas masks and a large order for masks is said to have gone to another Akron company. The F. B. Stearns Co., Cleveland, which will make Rolls-Royce airplane motors, is still buying equipment and will need about 100 more tools. Lansing, Mich., automobile plants are said to be assured of war contracts. The Reo Motor Co. will probably make shrapnel cases and the Auto Body Co. will make ambulance bodies.

Grand Rapids, Mich., furniture manufacturers have mobilized their facilities for the manufacture of airplanes. The Grand Rapids Airplane Co. has been organized with a capital of \$200,000 paid in and will serve as an operating company to distribute Government contracts among the manufacturers.

Manufacturers of so-called luxuries will be or already have been included in the war program. A talking-machine company in New Jersey is making time fuses and one in New England is at work on aircraft cameras. Even piano manufacturers may be called upon to furnish war material, probably airplane parts.

There has been somewhat of a lull in all machine-tool markets the past week so far as large lists are concerned. However, there has continued a fair average of small-lot inquiry. The American Can Co. is expected to buy about 150 new tools for its Edgewater, N. J., plant, where a contract for 4,000,000 75-mm. shells will be executed. About 50 tools have been commandeered in New York for Dodge Bros., Detroit. The International Arms & Fuse Co., Inc., Bloomfield, N. J., has about concluded its buying. The Standard Ordnance Corporation, Hamilton, Ohio, has purchased a part of its requirements for work on 155-mm. gun carriages. The Federal Shipbuilding Co. has issued a partial list of its machine-shop requirements. It is reported that the Continental Motors Corporation, De-

troit, has received a contract for 40,000 Liberty motors for Army trucks.

New England business continues active. The Liberty Ordnance Co., formerly the Bridgeport Projectile Co., Bridgeport, Conn., is undertaking large shell-forging contracts, and is to greatly increase its output of 5-in. naval guns. The rifles and cartridge plants of the Remington Arms U. M. C. Co. are increasing production. The new gun plant of the Bullard Engineering Corporation, Bridgeport, is nearing completion. The Colt's Patent Firearms Mfg. Co., Hartford, Conn., is equipping its newly acquired plant in Meriden. The Marlin Arms Co. is converting half of its Mayo radiator plant in New Haven, Conn., for rapid-fire machine gun manufacturing. The Sterling Motor Co., Brockton, Mass., is buying new equipment for munitions work, and is building addition to take care of orders for shells and gun sights.

Buying for the Rock Island Arsenal is the feature of present machine-tool demand in Chicago. Cleveland reports inquiry from the Government for tools to equip army repair trucks, which are to be used behind the lines in France.

An order for about 30 cranes of various sizes has been placed with the Chesapeake Iron Works, Baltimore, Md., by the Stone & Webster Engineering Corporation. The cranes will be used in the United States gun-repair shop in France.

New York

NEW YORK, Dec. 11.

There has been a lull during the past week in new demand for machine tools. There continues, however, a fair average of small-lot business, mostly from recent large buyers, who are rounding out their requirements.

The American Can Co. is expected to buy about 150 new machines for its Edgewater, N. J., plant, where a Government order for 4,000,000 75-mm. shells will be fulfilled.

The Federal Shipbuilding Co. has issued a list of a part of its requirements for its machine shop at the Hackensack Meadows shipyard.

The American Shipbuilding Co., Cleveland, has been trying to find tools in New York for equipping additions to its plants on the Great Lakes.

About 50 tools have been commandeered in New York for Dodge Bros., Detroit. These tools are among the lot recently catalogued by the Machine Tool Section of the War Industries Board, having been found in export warehouses ready for shipment abroad. All of them were held for the needs of American manufacturers.

The Standard Ordnance Corporation, 115 Broadway, New York, has placed a part of its orders for equipping its plant at Hamilton, Ohio, where 155-mm. gun carriages will be made. The International Arms & Fuse Co., Inc., has placed the bulk of its large orders for 6-in. shell work.

It is reported here that the Continental Motors Corporation, Detroit, has received a contract for 40,000 motors for Liberty motor trucks from the United States Army. A large part of the order will be filled in the company's Muskegon, Mich., plant.

The Du Bois Machine Shop, Inc., Albany, N. Y., has purchased a few new tools for making gun reamers for Government contractors.

The Chesapeake Iron Works, Baltimore, is reported to have received a contract for 30 cranes from the Stone & Webster Engineering Corporation for the gun-repair shops which this Government will build in France. The William Cramp

& Sons Ship & Engine Building Co., Philadelphia, is reported to have ordered additional cranes from the Bedford Foundry & Machine Co., Bedford, Ind. The Government wants several cranes for new shops at the Washington Navy Yard and a 250-ton gantry crane for the Sandy Hook Proving Ground, bids for which are now being taken.

There is little new in the export situation, except that export permits for Italy are easier to get, this Government coming to the assistance of its ally to supply her with whatever she needs. Export regulations except to our allies are very strict and comparatively little in the line of metal-working machinery is now going out.

The French Sheet Metal Works, New York, has been incorporated with a capital of \$10,000 to manufacture sheet metal goods. J. Cohen, M. M. Alpert and H. Coppel, 18 West 108th Street, are the incorporators.

The Imperial Metal Mfg. Co., Long Island City, N. Y., has been incorporated with a capital of \$175,000 to manufacture metal sprinkler bottle tops. The incorporators are S. Messner, C. Bomeister and O. Sondheim, Long Island City.

The Micropho Detector Co., 26 Cortlandt Street, New York, manufacturer of electrical devices, has increased its capital from \$150,000 to \$1,190,000.

The E. W. Bliss Co., Adams and Plymouth streets, Brooklyn, has had plans prepared for the construction of a six-story addition, 200 x 300 ft., to its projectile works at Fifty-third Street and First Avenue.

The Vogel Stamping Co., Brooklyn, has been incorporated with a capital of \$10,000 to manufacture metal goods. E. N. Helff, A. R. Ulrich and P. Suau, 24 East Thirteenth Street, are the incorporators.

The Pellegrino Coal Emptier Machine Co., New York, has been incorporated with a capital of \$10,000 to manufacture coal-handling machinery. M. Pellegrino, C. Caggiano and N. Selvaggi, 320 Broadway, are the incorporators.

The Wire Wheel Corporation of America, New York, has leased property, about 100 x 100 ft., at 829-35 Eleventh Avenue, for the establishment of new works.

The Taylor Gun Co., New York, has been incorporated with a nominal capital of \$5,000. S. McG. Pierce, W. B. Cowen and F. Blauvelt, 400 West 160th Street, are the incorporators.

The Production Equipment Co., New York, has been incorporated with a capital of \$20,000 to manufacture boilers and foundry supplies. W. J. Forster, W. W. Gibbons and S. M. Morey, 50 Church Street, are the incorporators.

The Procter & Gamble Mfg. Co., Port Ivory, Staten Island, will build a new machine shop, 60 x 120 ft., and other buildings, including producer and generator house, to cost about \$40,000. Construction has begun.

The Independent Aetna Sprinkler Co., New York, has been incorporated in Delaware with a capital of \$1,000,000 to manufacture sprinkler devices for fire protection. Roger H. Anderson and Edward W. Shaw, New York, are the incorporators.

The Hunoff Machine Works, 45 Mills Street, Astoria, L. I., has had plans prepared for the construction of a new one-story, brick machine shop, 20 x 50 ft., to cost about \$25,000.

The Union Air Craft Co., New York, has been incorporated with a capital of \$20,000 to manufacture airplanes. The incorporators are W. A. Callahan, B. Towles and W. E. Winne, 2 Rector Street.

The Independent Filter Press Co., New York, has been incorporated with a capital of \$25,000. J. E. Hagstrom, W. T. and G. F. Miller, 1486 Lexington Avenue, are the incorporators.

The Motor Starter Corporation, Long Island City, has purchased property on Jackson Avenue, near Skillman Place, for the erection of a new plant.

Fire Dec. 3 destroyed a portion of the shipbuilding plant of the Morse Dry Dock & Repair Co., Fifty-fifth to Sixtieth streets and waterfront, Brooklyn, with loss estimated at \$500,000. Four buildings were destroyed, including machine shop, pattern and joiner works, and carpenter shop.

The Gulf Shipbuilding Corporation, New York, has been incorporated in Delaware with capital of \$1,000,000. George V. Reilly, Arthur W. Britton and S. B. Howard, 65 Cedar Street, New York, are the incorporators.

The Auto Traffic Safety Appliance Co., New York, has been incorporated with a capital of \$100,000 to manufacture traffic safety devices. A. Farese and C. Pergola, 141 Hester Street, are the incorporators.

A new reinforced-concrete power plant, 80 x 120 ft., will be erected at the State Hospital, Central Islip, L. I., at a cost of about \$150,000. Contract has been let.

The Utica Steam Engine & Boiler Works, Utica, N. Y., will build a plant at Whitesboro Street to cost \$80,000.

The Power Specialty Co., 111 Broadway, New York, manufacturer of superheaters, etc., will build a new factory on Locust Avenue, Bloomfield, N. J., to cost about \$31,000.

The American Can Co., 449 Communipaw Avenue, Jersey City, N. J., has filed plans for the construction of an addition to its plant to cost about \$42,000.

The Hudson Welding Co., Jersey City, N. J., has been incorporated with a capital of \$50,000 to manufacture welding apparatus. W. J. Wukowski and Leonard Galewski are the incorporators.

The General Electric Co., Newark, N. J., has acquired the former plant of the Henry Lang Co., Seventeenth Avenue, Lillie and Boyd streets, Newark, which it will use for extensions.

The Upson-Walton Co. of New York, 462 Riverside Avenue, Newark, manufacturer of wire rope, will build a one-story addition to its works, 28 x 125 ft., to cost about \$10,000.

The Federal Real Estate Co., Newark, will build a new one-story machine shop, 25 x 90 ft., at 41 Bryant Street.

The Russell-Schwartz Co., 109 Frelinghuysen Avenue, Newark, has had plans prepared for the erection of a two-story addition, 49 x 83 ft., to its cabinet works, to cost about \$12,000.

The Splitdorf Electrical Co., 98 Warren Street, Newark, manufacturer of spark plugs, magnetos, etc., will build a two-story extension to its works.

Fire December 6 caused a damage of about \$20,000 at the plant of the Allegretti Mfg. Co., South Exchange Street, Geneva, N. Y., manufacturer of razor strops, etc.

The Rochester Nash Co., Rochester, N. Y., has been incorporated with a capital of \$25,000 to manufacture internal combustion engines and automobile specialties. J. E. Clifford, L. M. Sanford and M. T. Dubel are the incorporators.

The H. C. Leyden Co., Syracuse, N. Y., has been incorporated with a capital of \$25,000 to manufacture dental equipment. J. A. Norton, F. J. Starr and E. Leyden, Syracuse, are the incorporators.

New England

BOSTON, Dec. 10.

New England is beginning to swing into a faster stride on direct war work. In Bridgeport the Liberty Ordnance Co., which recently succeeded the Bridgeport Projectile Co., is undertaking large shell forging contracts and is to greatly increase its output of 5-in. naval guns. The rifle and cartridge plants of the Remington Arms U. M. C. Co. are rapidly increasing their production, and several other plants are adding largely to their working forces. The new gun factory of the Bullard Engineering Corporation is nearing completion and will be producing early in the year. The Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., is increasingly busy and is filling up its newly-acquired plant in Meriden. Every department of the Winchester Repeating Arms Co., New Haven, Conn., is showing the result of the large accretions being made in the number of employees, which is now about 16,000. The Marlin Arms Co., New Haven, is converting half of its Mayo radiator works for rapid-fire gun work and is pushing the organization and production of its plant at Norwich.

It is reported that several companies in the Connecticut valley, both in Connecticut and Massachusetts, expect to take on shell contracts and have been making inquiries about equipment. Matters are moving apace at the Watertown Arsenal, Watertown, Mass., and shops all over New England are busy on contracts for parts, mechanisms and tools for the arsenal. Things are in equally good condition at the Springfield Armory, Springfield, Mass. The Fore River Works, Bethlehem Shipbuilding Corporation, Quincy, Mass., is not only taking on hundreds of workmen but also has many plants busy on subcontracts. The destroyer plant at Squantum is coming ahead on schedule time and will be one of the busiest of New England plants in the early months of next year. The Osgood Bradley Car Co., Worcester, Mass., is organizing a working force to carry out its large gun carriage contract and is being aided by a voluntary movement on the part of other Worcester plants to furnish a sufficient number of skilled mechanics to provide a strong nucleus for the working force.

Machine tool plants everywhere are strengthening themselves to meet the huge business being offered. No one plant can be easily picked as busier than the others for virtually all of them have so many Class A priorities that they are booked up for months ahead on war work alone. Gun, shell, and aeroplane plants are equally anxious to secure machines in a hurry, and the call for tool room equipment is assuming a much livelier tone. The comparative quiet of the fall months in the contract tool and gage shops has been succeeded by rush of business even greater than was the case when America first embarked in munitions work for the Allies.

Most of the buying of machine tools in New England is on a small scale to balance up equipment to meet new conditions. The Sterling Motor Co., Brockton, Mass., is one of the companies buying new equipment for munitions work, and it is building an addition of some size to care for new orders for shells and gun sights.

The Robust Motor Co., Boston, has been incorporated with authorized capital stock of \$100,000 to manufacture engines. William P. Ross is president and Henry W. Foster, 118 Pearl Street, Boston, treasurer.

The Sterling Motor Co., Brockton, Mass., is building two one-story additions, 24 x 250 ft. and 24 x 280 ft.

The Bridgeport Machine & Tool Co., Bridgeport, Conn., has been incorporated with authorized capital stock of \$10,000 by Joseph Martin and others.

Landers, Frary & Clark, New Britain, Conn., are not only building several additions but have also leased from the American Hardware Corporation the building recently occupied by the Eastern Motors Co.

The Pilgrim Machine Co., Pawtucket, R. I., has been incorporated with authorized capital stock of \$20,000 by Arthur M. Allen, Frederick W. Tillinghast and James J. McGovern.

The C. H. Smith Co., Springfield, Mass., machinery, has been incorporated with authorized capital stock of \$50,000 by Walter G. Trotman, West Springfield; Charles H. Smith, Springfield, and others.

George A. Leighton, 136 Concord Street, Manchester, N. H., will build a one-story addition to his foundry on Silver Street, about 60 x 80 ft., to cost \$8,000.

Philadelphia

PHILADELPHIA, Dec. 11.

A one-story, brick and concrete power plant, 45 x 50 ft., to cost \$12,000, will be erected by the Tacony Ordnance Co., Tacony.

A new one-story brick machine shop, 44 x 140 ft., to cost about \$23,000, will be erected by the Espen-Lucas Machine Co. at Front Street and Girard Avenue, Philadelphia. Contract has been awarded.

The American Briquet Co., Twenty-fifth and Washington streets, Philadelphia, has increased its capital from \$200,000 to \$4,000,000.

The N. Z. Graves Co., 22-24 South Third Street, Philadelphia, has acquired a two-story foundry and pattern shop at Chestnut and Thirtieth streets for expansion.

The Quaker City Iron Works, 3003 Richmond Street, Philadelphia, has filed plans for the construction of a second-story addition, 16 x 50 ft., and other alterations and improvements.

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., specializing in the production of iron and steel castings, is planning for the erection of a one-story foundry addition.

The Standard Boiler Works, Lebanon, Pa., has been acquired by Mader Brothers & Co., who will operate the plant.

The Light Railway Equipment Co., Chester, Pa., manufacturer of railroad supplies, has acquired three acres at Ridley Park for the erection of a new plant. Contract for the initial structures has been awarded and it is expected to have the plant ready for occupancy in about six months. The company proposes to move its present works to the new location. Headquarters are in the Commerce Building, Philadelphia.

The Standard Car Construction Co., Sharon, Pa., has increased its capital from \$1,000,000 to \$2,000,000.

The Milton Mfg. Co., Milton, Pa., is planning for the operation of its shell department at full capacity to handle a Government order for shrapnel cases. It is expected to increase the number of employees to 600 within the next month.

The Peerblow Mfg. Co., Leetsdale, Pa., has been incorporated with a capital of \$10,000 to manufacture blow torches. F. P. Schmidt is treasurer.

The Chester Shipbuilding Co., Chester, Pa., is planning for the erection of a new punch shop, joiner works and other buildings to cost about \$250,000. It is also contemplating the construction of a first-aid hospital for employees.

Rogers-Gillen, Inc., Corry, Pa., has been incorporated with a capital of \$20,000 to manufacture hardware. J. S. Rogers is the principal incorporator.

A new power house will be erected by the Youngstown Sheet & Tube Co., Youngstown, Ohio, at its coal properties near Masontown, Pa.

The American Wire Fabrics Co., Mount Wolf, Pa., manu-

facturer of wire products, has inaugurated a night shift at its works to increase the output.

Baltimore

BALTIMORE, Dec. 10.

A. Weiskittle & Son Co., Lombard Street, Highlandtown, Md., is planning to rebuild three buildings of its stove and enamelware manufacturing plant, recently destroyed by fire with loss of about \$50,000.

M. M. Davis & Son, Solomons, Md., recently incorporated, has taken over the shipbuilding plant formerly operated under the name of M. Mitchell Davis & Son, and are planning to increase the capacity. M. M. Davis is president and Clarence E. Davis, vice-president and manager.

The Riter-Conley Co., Pittsburgh, Pa., is making additions to its shipbuilding plant on the Patapsco River, Fairfield, Md. The property was formerly owned by the Ellicott Machine Corporation and consists of about 18 acres. A new building, 50 x 300 ft., is being constructed to be used for plate work.

The Lummus Machinery Co., Spartanburg, S. C., is planning for the erection of a new machine shop and assembling works.

The Hendersonville Treenail Co., Hendersonville, N. C., recently incorporated with a capital of \$150,000, will establish works for the manufacture of pins for wooden vessels, etc. Howard Bennett heads the company.

The Powhattan Brass & Iron Works, Charleston, W. Va., will build a one-story addition to its foundry.

The Kerr Brothers Machine Co., Pennsboro, W. Va., will build a new one-story machine shop, 35 x 60 ft., for the manufacture of oil-well tools and equipment.

The Piedmont Motor Car Co., Lynchburg, Va., will build a one-story extension to its plant, 50 x 150 ft., for the manufacture of automobile bodies.

The Virginia Forging & Mfg. Co., Richmond, Va., has been organized to manufacture bronze forgings and high-grade brass and composition castings. It has purchased the equipment of the Richmond Scale Co., manufacturer of computing scales, and will continue the business. A new and larger plant will be occupied and such additional equipment as is necessary will be purchased.

P. Kennedy, Charles and Wells streets, Baltimore, will build a one-story foundry, 80 x 80 ft., to cost \$15,000.

The Autogeneous Welding & Machine Co., 1219 Maryland Avenue, Baltimore, has been incorporated with \$100,000 capital stock by John J. Kernan, William T. Hudgins, William A. Norton, Robert C. Shipley and Joseph W. Brooks.

The Penn-Seaboard Steel Corporation is said to have decided to build an addition to its plant on the Delaware River near Wilmington, Del., at a cost of about \$2,000,000. The improvements will also include a power house to cost \$300,000.

Chicago

CHICAGO, Dec. 10.

In the past week the Rock Island Arsenal closed for about 100 machines, the list including 68 engine lathes of 20 to 24-in. swing and 10 to 24-ft. bed. Of the number, 22 were 24-in. by 20 ft., and 32 were 24-in. by 24 ft. Otherwise the list consisted of miscellaneous tools. It is understood that its requirements for equipment to manufacture guns with recoil mechanism have not yet been satisfied except for odds and ends of tool-room equipment.

Except for the arsenal business, which was well distributed, the market has been quiet with most sellers, some of whom are not attempting to do much aside from caring for war demands. More business is being done with Eastern buyers, mainly through correspondence, but like all purchasers they must claim deliveries on priority orders. Occasional conflict of class A priority certificates continues, but in these cases Government ruling must be had before deliveries are made. There is no abatement in the demand for heavy machines—the trouble is to get them. Tool-room equipment is active.

The Scharmer Construction Co., 139 North Clark Street, Chicago, has the general contract for a one-story brick and mill construction addition, 102 x 226 ft., for the Chicago Bearing Metal Co., 2216 to 2228 West Forty-third Street, which is to cost about \$25,000.

Sub-contracts have been let for a one-story factory extension, 75 x 120 ft., of steel and concrete, for the Templeton Kenly Co., Ltd., railroad supplies, 1020 South Central Avenue, Chicago.

A permit has been issued to James W. Stevens, 16 South La Salle Street, Chicago, for the construction of a five-story

garage, 80 x 181 ft., at 215 to 221 Washington Street, Chicago, to cost \$175,000. It is to be used by a taxicab service.

The Western Electric Co., Chicago, will erect at Cicero a brick manufacturing building, 37 x 249 ft., adjacent to a six-story building recently completed.

The Pullman Couch Co., Chicago, has purchased a plot of 63,500 ft. in the central manufacturing district on which it will erect a building at a cost of \$300,000 to \$500,000 to conform with its present plant on adjoining property.

The Woodruff & Edwards Co.'s foundry, Elgin, Ill., was recently destroyed by fire involving a loss of about \$150,000. It was necessary to use dynamite to raze buildings to prevent the spread of the fire.

The Green Engineering Co., East Chicago, Ind., will erect a manufacturing building, 60 x 80 ft., to cost about \$11,000.

The Standard Metals Reduction Co., Chicago, has been incorporated in Delaware with a capital of \$2,000,000. James H. Aye, T. T. Watson and J. E. Harper, Chicago, are the incorporators.

Milwaukee

MILWAUKEE, Dec. 10.

The local machinery market continues broad and urgent, machine-tool production being constantly enlarged, but hardly sufficient measure to enable manufacturers to catch up on deliveries. This is also true of crane manufacturers, pressure upon whom grows daily. Although foundries meet increasing difficulty in obtaining coal and coke supplies, every available furnace in Wisconsin is said to be in active service and foundry owners who find it possible to do so are enlarging their capacities. The congestion of transportation in this section is less serious than east of Chicago.

The George H. Smith Steel Casting Co., 500 Clinton Street, Milwaukee, has awarded a contract to Klug & Smith, consulting engineers, Mack Block, for the erection of a brick and steel foundry addition, 45 x 100 ft., and a four-story brick office building and pattern storehouse, 75 x 100 ft. A new 3-ton open-hearth furnace has been installed. The foundry addition will be equipped with a 10-ton crane, already contracted for. The plant capacity will be increased to 750 tons per month by these improvements. F. E. Hinners is secretary and treasurer.

The Menominee Electric Mfg. Co., Menominee, Mich., maker of electric fans and other appliances, has accepted the proposition of business men at Cairo, Ill., to remove its business to that city about Feb. 1. It will be reorganized with a capital stock of \$600,000, of which over \$250,000 has been subscribed for in Cairo. A fireproof plant, including a foundry, will be erected on a three-acre site. The plant at Menominee will be continued in operation at least eight months longer. Henry Tideman is president and general manager.

The United States Gearshift Co., manufacturer of hydraulic gear-shifting mechanisms for motor vehicles, Eau Claire, Wis., has awarded general contract to R. L. Rickman, Eau Claire, for construction of the first unit of its new four-story plant, 65 x 80 ft., of reinforced concrete, steel and brick, with a separate office building, 20 x 65 ft. The brass and aluminum foundry will be located on the fourth floor and will be equipped with gas furnaces. The machine shop will occupy the third floor and the assembling and finishing departments the second floor. Pending the completion of the new plant, manufacturing operations will be conducted under contract with the Eau Claire Mfg. Co., which has started its foundry and machine shop recently completed. L. A. Laursen is general manager.

The Gardner Machine Co., manufacturer of disk grinders, etc., Beloit, Wis., has awarded general contract to the Newton Engineering Co., 185 Mason Street, Milwaukee, for the erection of a pattern storage and general warehouse costing about \$40,000.

The Badger Brush Co., 3417 Vliet Street, Milwaukee, has taken over a three-story building, 40 x 80 ft., and will remodel it for its own purposes at a cost of \$15,000.

The Chippewa Foundry & Machine Co., Chippewa Falls, Wis., has increased its capital stock from \$100,000 to \$250,000, to provide funds for financing its increased business.

Harry Gipford, Ellsworth, Wis., is building a machine-shop and smithy, 40 x 60 ft., to be ready Jan. 1. It will cost about \$5,000 equipped.

The Western Steel & Mfg. Co., DePere, Wis., manufacturer of steel barn equipment and agricultural castings, is contemplating additions to its plant and power house, estimated to cost \$25,000.

The Humane Stanchion Works, Baraboo, Wis., are being enlarged by the erection of a three-story brick shop addition, 40 x 40 ft.

The Northern Foundry Co., Marinette, Wis., commenced operations in the former plant of the Marinette Iron Works Dec. 6. It is occupying 19,000 sq. ft. of floor space and the output will be 10 tons of agricultural and automobile castings daily, to be increased to 15 tons as soon as more labor is available. Practically the entire production is taken by the J. I. Case Threshing Machine Co., Racine, Wis.

The Joseph Schlitz Brewing Co., Milwaukee, sustained an estimated loss of \$30,000 to \$40,000 through the collapse of the electric traveling crane employed in its Commerce Street coal dock. Reconstruction will be undertaken at once. Joseph E. Uihlein is general manager.

Detroit

DETROIT, Dec. 10.

Increased industrial activity has unusually stimulated inquiry for machinery, although but few large orders were placed the past week. The market is distinctly on an upward trend, and jobbers believe that each week will see an increased demand for tools. Deliveries on most standard machines are set for from six to eight months ahead.

Money is beginning to flow back into Detroit and bankers predict that it will soon be more readily obtainable for building purposes. This is expected to stimulate the machine-tool market. Skilled labor is in great demand and many plants are handicapped by their inability to secure expert workmen. Detroit manufacturers, as well as those of the State, are turning more and more to the manufacture of munitions.

The furniture manufacturers of Grand Rapids have mobilized their plants for the manufacture of airplanes. The Grand Rapids Airplane Co. has been organized and more than \$200,000 capital stock subscribed. It will serve as an operating company and will distribute contracts from the Government among its member manufacturers. The officers are Samuel D. Young of the Grand Rapids Show Case Co., president; F. Stuart Foote of the Imperial Furniture Co., vice-president; J. Hamilton Hoult of the Luce Furniture Co., treasurer; C. C. Kusterer of the Stickley Bros. Furniture Co., secretary.

Lansing, Mich., automobile plants are now undergoing a period of readjustment, presumably in preparation for munition contracts. It has been reported that the Reo Motor Co. has been assured some shrapnel case contracts and to that end certain changes in machinery are being made. The Auto Body Co. is reported about to receive a contract for ambulance car bodies.

The Lincoln Motor Co., Detroit, which is erecting a new plant for the manufacture of Liberty airplane motors for the Government, has the main part under roof and expects to start operations about Feb. 15. The main building is a four-story ell-shaped brick and steel structure, 80 x 1200 ft. Other buildings include a one-story warehouse, 80 x 500 ft.; a power house, and an 800-ft. building for testing motors. Construction of a large administration building has just been started. The plant occupies a 70-acre site at Warren and Livernois streets. Henry M. Leland, formerly head of the Cadillac Motor Car Co., is president. The company has purchased about \$2,500,000 worth of machine tools for this plant and the one that is now in operation.

Dodge Bros., Detroit, are rushing work on their new plant for the manufacture of recoil devices for the Government and expect to have it ready for operation early in the spring. The main building is of brick and steel, 578 x 818 ft.

The Federal Motor Truck Co., Detroit, has let contract for the construction of a brick and steel addition which will greatly increase its floor space. With the completion of this structure the company's facilities will have been doubled in the past year.

The Northwestern Glass Co., Saginaw, Mich., is remodeling the plant of the old Michigan Glass Co. and equipping it. Officials announce that operations will start Jan. 1.

The Sonora Phonograph Co., Saginaw, Mich., is reported planning extensive building operations and an addition in the number of its employees.

The Saginaw Shipbuilding Co., Saginaw, Mich., is rushing work on its new plant and expects to start work this month on the first of six ships already contracted for by the Government. Its capitalization has been increased to \$500,000. F. W. Wheeler is president; George H. Hannum, vice-president; W. C. Hill, treasurer, and C. W. Stiver, secretary.

The Four Drive Tractor Co., Big Rapids, Mich., will erect an addition to its plant.

Indianapolis

INDIANAPOLIS, Dec. 10.

The F. W. Spacke Machine & Tool Co., Indianapolis, has obtained a contract from the Government for the manufacture of 4,275,000 hand grenades. The company was recently reorganized and the factory purchased from Spacke Bros., who had been operating the plant several years. The Government will furnish much of the material for the contract and the grenades will be loaded elsewhere.

The Standard Pattern & Mfg. Co., Richmond, Ind., has changed its name to the Richmond-Standard Mfg. Co.

The Maxwell Motor Co., Newcastle, Ind., has booked a Government order and increased its running schedule from eight to ten hours.

Fire at the plant of the Columbia Mattress Co., South Bend, Ind., Dec. 5, caused a loss of \$25,000.

The Superior Concrete Machine Co., North Judson, Ind., has been incorporated with \$60,000 capital stock to manufacture silo block machines. The directors are Charles W. Weninger, Perry H. McCormick, Frank J. Vessely, Albert Fisher and Chester A. McCormick.

The Power Supply Co., Terre Haute, Ind., has been incorporated to manufacture machinery. The directors are Ray J. Diekemper, R. D. Heer and B. Heer.

The Standard Steel Car Co., Hammond, Ind., has taken out a permit for an 800-ft. building to cost \$250,000.

The Delta Electric Co., Marion, Ind., has received a Government contract for 20,000 electric lanterns of special type for the navy.

The Standard Steel Car Co., Hammond, Ind., has been granted a permit for a building, 280 x 500 x 24 ft., and an addition to an old one, 280 x 600 x 24 ft., at a cost of \$250,000. The company has a war contract which, it is reported, will require about 10,000 additional employees.

Cleveland

CLEVELAND, Dec. 11.

A large volume of inquiry for small lots of machine tools developed the past week, practically all for Government work. Among new inquiries are some directly from the Government for small lots of machines for equipping army repair trucks. More Government work has been placed, and a large amount is being figured upon. Some Detroit automobile companies are particularly interested in this, as Government orders will keep plants busy that would otherwise be forced to run on a very limited capacity. Many of the leading automobile plants in that city are already being rapidly transferred into war material plants. Among Government orders placed last week was one for 50,000 mine anchors, which was divided between two Detroit automobile manufacturers. An Akron tire manufacturer is understood to have taken orders for 450,000 gas masks, and another large order for masks is reported to have also been placed with an Akron company. The F. B. Stearns Co., Cleveland, is still in the market for about 100 additional machines for manufacturing Rolls-Royce airplane motors. Although unofficial reports have come from Washington that the Government has decided to change its airplane program and use Liberty motors only for scout machines and not for fighting planes, this reported change has not affected the large orders for airplane motors that were recently placed with Detroit plants.

The Marvel Accessories Mfg. Co., St. Clair Avenue and East Seventy-third Street, Cleveland, is in the market for about \$20,000 worth of machine tool equipment, including one 20-in. boring mill and a number of small tools, mostly lathes and hand milling machines.

The Austin Co., Cleveland, has taken a contract to erect a sulphuric acid plant at Forcite, N. J., for the Atlas Powder Co. of Wilmington, Del. It will consist of an absorber house, 82 x 110 ft.; a burner and purification house, 94 x 110 ft.; a blower house, 28 x 30 ft., and a preheater and converter house, 62 x 126 ft. The Austin Co. has the contract for the buildings, the electrical work and foundations for equipment, and will install equipment furnished by the owners, including preheaters, tanks, filters, etc. The plant is to be ready for operation March 1.

The American Shipbuilding Co., Cleveland, will make extensions to the plant of its Detroit subsidiary, the Detroit Shipbuilding Co. They will include a gray iron foundry, brass foundry, boiler shop, and miscellaneous buildings.

The Wellman-Seaver-Morgan Co., Cleveland, has taken an order from the Chile Copper Co. for a 12-ton ore bridge for use in connection with leaching vats, and for a gantry crane for the Pennsylvania Railroad for use in trimming cars at South Buffalo.

The Pittsburgh & Conneaut Dock Co., Conneaut, Ohio, has placed a contract with the Frazer & Sheal Co., Cleveland, for an ore-handling bridge to replace one blown down last summer. A 10-ton bucket for this bridge will be furnished by the Wellman-Seaver-Morgan Co.

Plans for a new machine-shop foundry to be built by the Toledo Machine & Tool Co., Toledo, Ohio, are being prepared by Langdon & Hohly, architects, Toledo. It will be one-story, 150 x 379 ft.

The Acklin Stamping Co., Toledo, Ohio, has placed a contract for the erection of a factory addition.

Plans are being made for the establishment of a plant in Lima, Ohio, for the manufacture of rivets of a special type, designed by G. B. Phillips, head of the boiler department of the Lima Locomotive Works. It is the intention to organize a company with a capital stock of probably \$300,000 to place the rivets on the market.

The Star Tractor Co., Findlay, Ohio, has placed contracts for the construction of a one-story factory building, 50 x 160 ft., for the manufacture of farm tractors.

The American Crayon Co., Sandusky, Ohio, is planning the erection of a plant for manufacturing picric acid for the Government.

The Phoenix Electric Co., Mansfield, Ohio, has commenced the erection of a new plant, 50 x 100 ft.

The Cleveland Controller & Mfg. Co., Cleveland, has been incorporated with a capital stock of \$200,000 by L. A. O'Neill, L. C. Splith, and others.

California

SAN FRANCISCO, Dec. 4.

Large-sized tools are very scarce. Some manufacturers' representatives find them impossible to get, and have ceased quoting them. Shipments, where orders are accepted, are very slow, from nine to 12 months' time being usually demanded. Orders for parts to be used in gun-making and torpedo-boat destroyer construction are taking precedence over all other orders, even over some other Government work. The demand for smaller tools and machines is good, and the supply is improved.

The Pacific Coast Shipbuilding Co., San Francisco, of which Henry T. Scott, formerly of the Union Iron Works, and John T. Scott of the Moore-Scott Iron Works are the promoters, has now been fully financed and has broken ground for its plant at Bay Point. It is planned to spend a large sum in laying out the 2100 acres which the company has secured. A town site has been surveyed and plans made to house its employees. A large amount of machinery has been ordered in the East and, with Government assistance, prompt deliveries have been arranged for. The company has signed a contract with the Government to construct ten 9400-ton steel freight steamships. It is understood that all arrangements for engines for these vessels were completed before the contract was signed. Work on the first ship will begin March 1, 1918, and it is to be ready to launch by October. After that one ship is to be launched each month.

The Union Construction Co., Oakland, has secured an option on 48 acres of waterfront land and will erect a ship-building plant.

Baker & Hamilton, San Francisco, jobbers in farm implements and vehicles, and the Pacific Hardware & Steel Co., dealer in heavy engineering machinery, San Francisco, will merge their interests Jan. 1. Details have not yet been worked out.

The Rosenberg Iron & Metal Co., San Francisco, has purchased an entire block of land in Oakland and will establish a scrap yard, equipped with spur tracks and a locomotive crane.

The Pacific Coast Can Co., San Francisco, has purchased five acres in Oakland as site for a plant of 1,500,000 cans per day capacity, to cost in all \$1,000,000.

The Grant Motor Corporation, Cleveland, Ohio, is building two additions to its factory at Santa Cruz, Cal., 160 x 647 ft., and 160 x 400 ft.; also a two-story office building, 40 x 160 ft.

Fred Ballister of Oakland and others have practically completed plans for the establishment there of a large malleable iron foundry. It will be situated on the waterfront on a site already secured by lease. Oakland and San Francisco capital are reported behind the project.

The Columbia Steel Co., Pittsburg, Cal., is building an addition, 60 x 120 ft., to its main foundry and a building 60 x 300 ft., in which will be placed two 30-ton and one 10-ton travelling cranes. A new 15-ton locomotive crane will also be added. Preparations are being made to house and feed 200 additional employees. Improvements are to be completed March 1. The output of the plant will be increased 60 to 70 per cent.

The Dow Pump & Engine Co., Oakland, is enlarging its foundry to a capacity of 16 tons of iron and 8 tons of brass per day. An additional cupola is being built for the iron foundry.

The Byron Jackson Iron Works, San Francisco, is moving into its new factory in West Berkeley, and will be in complete running order Jan. 1. All heavy work will be taken care of in the new factory, the old plant being utilized for lighter work. Practically all tools required were ordered a year ago.

The Southern Pacific Railroad Co. announces a building program at Sacramento to include an \$80,000 plant for work on switches, crossing frogs and other railroad track accessories.

The Los Angeles Shipbuilding & Drydock Co., Los Angeles, has filed plans for the construction of a pattern shop, 50 x 75 ft.; forge and blacksmith shop, 60 x 100 ft.; pipe shop, 16 x 130 ft., all one-story, and warehouse, 100 x 160 ft., at its plant on Smith's Island.

The Herberts Machinery & Supply Co., Los Angeles, has been incorporated with a capital of \$20,000 to manufacture machinery, etc. The incorporators are Curtis A. Herberts and Alfred C. Pfordner, Los Angeles, and Benjamin C. Flanagan, San Gabriel.

The National Compressed Air Machinery Co., Los Angeles, has been incorporated with a capital of \$50,000 to manufacture compressed air equipment. Frank A. Hartford, Benjamin Schonfeld and William A. Chisholm, are the incorporators.

The Fulton Shipbuilding Co., Los Angeles, will build a new one-story assembling works, 48 x 125 ft., at its plant on Mormon Island, Wilmington district.

The McEvoy Well Strainer Co., Los Angeles, has been incorporated with a capital of \$100,000 to manufacture oil well strainers and allied products. Frank L. A. Graham and George A. Howk, Los Angeles, and M. J. Trumble, Alhambra, are the incorporators.

The United Power Co., Los Angeles, has acquired the former properties of the Electric Power Co., in the San Gabriel Canyon, and contemplates the construction of a new power plant at Iron Fork.

The Safetyford Starter Co., Los Angeles, has been incorporated with a capital of \$10,000 to manufacture automobile starters. Charles Trepfagen, Fred C. Stillwell and Richard A. Jocqson, are the incorporators.

The Pacific Northwest

SEATTLE, Wash., Dec. 4.

The Barnes & Fischer Co., Seattle, has started operations in its new plant, 810 First Avenue South, which will specialize in the manufacture and repair of mill machinery.

The Schaafe Machine Co., New Westminster, B. C., will move its general machine shop to Vancouver in January. Its shell making plant will be left in New Westminster and will be kept ready for any further Government orders that are available. The Vulcan Iron Works, New Westminster, will also keep its munition plant intact.

Plans have been completed for the second structure for the Erickson Engineering Co., Seattle. It will be 80 x 360, two stories, and cost \$20,000.

T. Danielson, Vancouver, Wash., will erect a plant to construct small boats.

Gold Hill, Ore., plans to expend \$25,000 in developing its water system, in connection with the Grants Pass-Gold Hill Irrigation project.

Bert Moore, Toledo, Ore., plans the installation of a tie mill, to manufacture ties and ship knees.

Canada

TORONTO, Dec. 10.

The Eagle Smelting & Refining Works, Ltd., Montreal, has been incorporated with a capital stock of \$40,000 by Peter Bercovitch, Ernest Lafontaine, Nathan Gordon and others to manufacture, refine and smelt babbitt, solder, brass, lead and other metals.

The Dominion Bridge Co., Montreal, is manufacturing marine boilers, and is now engaged on a contract for one of the Allies. It will also manufacture turbines for steam power plants. The company has obtained a controlling interest in the International Engineering Works, Ltd., Montreal and Amherst, N. S., and will carry on the business as a subsidiary. Additions will be made to the Amherst plant and new equipment will be installed. Tenders for the work will be called in the near future.

The Colonial Lumber Co., Pembroke, Ont., will rebuild

its lumber mill, recently destroyed by fire with a loss of \$75,000, and will purchase new equipment.

The Marine & Stationary Engine Mfg. Plant, Ltd., St. John's, Newfoundland, will erect a plant to cost about \$15,000.

The Bond Engineering Works, Toronto, is calling for tenders for an addition to its foundry on Villiers Street, to cost \$8,500.

P. H. Secord & Son, Sydenham Street, Brantford, Ont., have been awarded the contract for the erection of an addition to the foundry of the Canada Machinery Corporation, Galt, Ont., to cost \$30,000. The company is in the market for a 25-ton crane.

The Ontario Wind Engine & Pump Co., Liberty Street, Toronto, is building an addition to its plant to cost \$8,000.

Blenville, Que., is receiving prices on a hydraulic pump with a daily capacity of 250,000 gal.

The Hydro Electric Power Commission, Toronto, Sir Adam Beck, chairman, has decided to construct extensions to the plant of the Ontario Power Co., calling for an expenditure of over \$1,000,000. The extensions will make 25,000 hp. additional available by July next and another 20,000 hp. within the next three or four months. All contracts will be made through the Ontario Power Co. for the Hydro Electric Power Commission.

The Polson Iron Works, Toronto, was damaged to the extent of about \$200,000 by fire Dec. 6. The pattern shops, mill and pattern storage warehouse and a number of other buildings were totally destroyed and considerable damage was caused to ships under construction. It will not be necessary to suspend operations. That portion of the plant destroyed will be rebuilt without delay and new equipment will be purchased.

Government Purchases

WASHINGTON, Dec. 10.

The Bureau of Yards and Docks, Navy Department, Washington, will receive proposals until Dec. 17 for furnishing and delivering two 300-kw. motor-generator sets and switchboards at the Navy Yard, New York; four 300-kw. motor-generator sets and switchboards at the Navy Yard, Philadelphia; four 300-kw. motor-generator sets and switchboards at the Navy Yard, Norfolk, Va., and three 500-kw. motor-generator sets at the Navy Yard, Washington. Drawings and specifications No. 2711 may be obtained on application to the commandants of the navy yards named or to the Bureau of Yards and Docks.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, for furnishing three turret lathes for Philadelphia, schedule 2434 1/2, opening date Dec. 17.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on Nov. 30 for furnishing material and supplies for the naval service, as follows:

Schedule 2288 1/2; steam engineering; class 11; various deliveries—220 motor generator sets—Bid 6, \$70,697 and \$62,977; 10, \$85,084.50; 17, \$57,867; 18, \$65,412; 24, \$93,256.50; 28, \$78,375.55; 42, \$66,566; 50, \$57,870; 63, \$56,511.07.

Schedule 2295 1/2; steam engineering; class 47; Norfolk—25 circulating pumps—Bid 61, \$15,650. Class 48; Norfolk—50 feed water pumps—Bid 51, \$10,512.50; 61, \$12,700. Class 49; Norfolk—25 oil lubricating pumps—Bid 61, \$6,250. Class 50; Norfolk—50 fuel-oil service pumps—Bid 61, \$9,875. Class 51; Norfolk—25 radoget air pumps—Bid 58, \$19,825.

Names of the bidders and the numbers by which they are designated in the above list follow:

Bid 6, Burke Electric Co., Erie, Pa.; 10, Crocker-Wheeler Co., Ampere, N. J.; 17, Diehl Mfg. Co., Elizabeth, N. J.; 18, Elevator Supplies Co., Inc., Hoboken, N. J.; 24, General Electric Co., Schenectady, N. Y.; 28, Holtzer-Cabot Electric Co., Boston; 42, National Electric Supply Co., Washington; 50, Roth Brothers & Co., Chicago; 63, Robbins & Myers Co., Milwaukee; 61 Worthington Pump & Machine Corporation, New York; 51, Scranton Pump Co., New York; 58, C. H. Wheeler Mfg. Co., New York.

On Dec. 4 the following bids were received by the Bureau of Supplies and Accounts, Navy Department:

Schedule 1569; steam engineering; class 41; Brooklyn—one heavy-duty engine lathe, direct-current motor—Bid 15, \$27,436; 22, \$19,869; 29, \$22,035; 36, \$1,100, \$1,150, and \$1,200. Alternate bid A. Do, alternating current—Bid 15, \$26,545. Alternate bid B. Do, belt driven—Bid 15, \$24,424; 22, \$18,150; 27, \$16,000.

Schedule 1567; ordnance; class 51; Hingham, Mass.—one horizontal boring and drilling machine, motor driven—Bid 29, \$6,060.

Names of the bidders and their numbers follow:

Bid 15, I. H. Johnson, Jr., Co., Inc., 337 North Fifteenth

Street, Philadelphia; 22, Manning, Maxwell & Moore, Inc., New York; 29, Niles-Bement-Pond Co., New York; 36, Taylor Machine Co., Boston; 27, C. H. McCarthy, Inc., New York.

THE GERMAN STEEL TRADE

Plant Deterioration and Additions—Importance of the Brièy Ore Deposits

SPEECHES delivered by prominent German steel-makers at recent annual meetings of German companies contain many interesting statements. Some of these have been recently published in the *London Iron and Coal Trades Review* and extracts from them are as follows:

"Mr. Springorum, in addressing the shareholders of the Hoesch Iron & Steel Works Co., pointed out the unusually great depreciation in the company's machinery and plant owing to war work, and especially on account of the inferior lubricating materials available and the lack of skilled workmen. It would be necessary either entirely or partly to renew the plant as soon as possible. It had been almost wholly impossible during the war to proceed with the urgently necessary work for the extension and completion of the company's departments. Further large expenditure would be required after the war for other purposes, concerning which it was deemed premature to give any information at present.

"Mr. Hilger, manager of the Ver Königs und Laurahütte, informed the shareholders that the new steel works at the Königshütte was completed and a new 50-ton steel furnace would be finished at the Laurahütte in December. Great value was attached to the utilization of all the supplies of minette ore. The Laurahütte was supplied with Swedish ore and unconditional safety was obtained by the faithful observance of contracts by their Swedish business friends, where an export veto was not to be expected. The supply of Germany with ore from her western neighbor could very probably be carried out by means of long-term contracts, all the more so as the Germans had good experience of the business adherence to contracts by the French. Austrian manganese ore also, as well as the ore which would be obtainable in very considerable quantities from South Russia after the war, would afford substitutes for the possible refusal of deliveries by the Rio Tinto Co.

The Brièy Ore Regions

"Mr. Beukenberg, speaking at the annual meeting of the Phoenix Steel Co., referred to the probable situation after the war. He stated that the efforts manifested at the Economic Conference in Paris had received great additional support by the entrance of the United States in the war and by the attitude of some of the countries in South America. The object was to cut off Germany from supplies of raw materials and to render the export trade difficult, if not impossible, through the customs policy of foreign countries, and by special measures in regard to shipping, etc. By means of a victorious war, however, the Germans must prevent the conclusion of such agreements or secure their revocation, but even then trouble would be experienced in regaining the old markets.

"The question of the future supply of iron ore for the industry was of special importance, and the speaker hoped that the ore region of Brièy would be retained. The immense value of that basin had been shown during the war. It would have been impossible to carry on the war with such results if the basin had not been occupied immediately on the outbreak of hostilities. The mines there were soon set in operation and had furnished an abundance of ore to the German industry. The occupation of the basin was also an important protection for the German Lorraine industry, which otherwise would have been overrun and paralyzed. France could not utilize the ore, because of the lack of adequate coal supplies, and it was for this reason that the French demanded the absorption of the coal districts of Saarbrücken. If the Brièy basin were obtained, the vitality of the German iron industry would be prolonged by 100 years, and the present production of pig-iron

could be maintained for 40 to 50 years. If the outlook after the war was not quite favorable, there was a reverse side to the question, as the Germans would be able to exchange for food products and raw materials part of their production of coal, potash, iron and steel manufactures and machinery."

Organization of the Western Electric Co.

(Continued from page 1415)

all the activities of the house, and each a complete organization in itself, comprising departments for business getting, warehouse service and collection of accounts. These managers report up to the head of the sales department to whom they are responsible for results.

But the other general departments have a measure of responsibility for the performance of their functions at the houses.

To illustrate, the comptroller prescribes the form of accounts and the accounting methods to be followed, and, through inspections by his own staff, sees that his instructions are followed.

The treasurer lays out the methods for the work on credits and collections and inspects this work.

The head of the purchasing department does the same kind of work with reference to the purchasing function. If he finds that some or all of the houses are buying the same class of material and that by combining the purchases an economy would be effected, an arrangement is made according to an established routine by which this article is added to the list of principal purchases, all of which are bought by the general purchasing department.

The experts of the manufacturing department inspect the warehouses for fire hazards and general upkeep. They also determine whether manufacturing work shall be carried on in the repair shops, which are a part of the local warehouse organizations, or in the general manufacturing department at Hawthorne, Ill. The purpose of this is to see that the manufacturing plant is built only at such places where the work can be done to the best advantage from the point of view of the whole company.

A manager is surrounded by a ring of advice and protective measures, but, at the same time, he is held strictly accountable for the results of his house. He makes the periodical reports on the condition of this business, such as the volume of sales, the amount of stock on hand, the amount of accounts receivable. Suppose his accounts receivable were to run an average of fifteen days higher than the standard set. It would be the treasury department that would call his attention to this variation, seek from him an explanation therefor, and, in the event that the situation responsible for it was one calling for expert assistance to the manager, the treasury department would very likely furnish from its staff a man competent to help the manager correct the situation. In this fashion the functional organization works, not to embarrass the distributing house man, but to assist him.

The Working of a General Committee

Under the general instructions a series of directions are issued by the heads of the general departments covering the functions for which they have a company responsibility, and such directions are mandatory throughout the organization. Such instructions would lead to a lack of team work if all of the departmental executives were not working on a common plan. These common understandings and unity of action are obtained through the meetings of a general committee which is composed of the executive heads of the seven general departments mentioned.

The members of this general committee discuss questions of policy, questions of internal management arising in their departments, appropriations for increases of plant or investment, appropriations for expense, and consider such other important company matters as may be brought to their attention. The purpose of this committee work is to arrive at conclusions

which will represent the combined judgment of its members and to develop a uniform company policy in all departments.

In turn, each department large enough to justify it has a departmental committee for the same purpose, and they have proved to be of great value in bringing about common understanding of company policies and a singleness of purpose in the work.

Each year we prepare budgets to cover the sales estimated for the coming year and the expenses of each department incident to handling this volume of business. The complete budget also contains all of the other items of expense not directly related to the current sales, so that at the beginning of each year a standard is set for the work of each unit of the organization. As an administrative measure this is of the greatest importance. The result desired is definitely known. Plans for securing it are made in advance, and the doubtful or weak spots in our defenses are marked out for special attention. Oftentimes, the personnel changes. One man is not fitted to do just the work of his predecessor and the load must be adjusted to his capacity. At other times the importance of the work changes so that jobs must be divided or combined. These considerations make it necessary to modify our ideal organization, but under such stress and strain we try never to lose sight of our ideal, which, to our minds, is a highly developed functional organization with an adequate central control.

CONSERVATIVE POLICY

Preference for Essential Industries, but Others Will Be Handled Carefully

WASHINGTON, Dec. 11.—An important advance in the Government's policy to discriminate in favor of industries contributing to the war and against those roughly classed as non-essentials was made during the past week when the priority officer of the War Industries Board issued a sweeping order giving preference in transportation to war material, fuel for certain specified purposes, and food products. This action was supplemented by the appointment of George N. Peek, vice-president of the Deere Mfg. Co., Moline, Ill., as the head of the new Bureau of Manufacturing Resources, the function of which will be to concentrate the industrial equipment of the country upon the conduct of the war. Further developments will follow as soon as time has been afforded for the organization of the new bureau, but the Council of National Defense makes the reassuring statement that an extremely conservative policy will be followed in the treatment of the so-called non-essentials and that the guiding principle of the new bureau will be intelligent discrimination in favor of war industries rather than drastic discrimination against the non-essentials.

Carefully Considered

Priority Order No. 5, promulgated by Judge Lovett Dec. 7, was under consideration by the War Industries Board for a fortnight before it was issued. It is characteristic of the conservatism of the board that, although the preferences embodied in the order are vitally necessary to speed up war work, Judge Lovett and his colleagues were reluctant to make any comprehensive order binding upon the carriers lest the general industries of the country should be demoralized as the result of the discrimination in freight treatment that would follow. With regard to fuel, the most vital of all war supplies, the board decided to defer issuing a peremptory order until the effect of a formal request for preferential treatment in the distribution of coal made by Fuel Administrator Garfield on Dec. 1 could be tested. Both producers and carriers responded promptly to Dr. Garfield's requests, but conditions did not improve to the desired extent and the efforts made to give preferential treatment to certain shipments of coal promised to interfere seriously with the transportation of iron and steel and other forms of war material. After waiting a week, there-

fore, the War Industries Board decided to issue a general order above referred to, the paragraphs relating to military supplies being as follows:

3. (a) Shipments of military supplies when consigned direct to the United States Government or the authorized officers of the United States Army, Navy or Shipping Board, or to the Allies or the proper representatives thereof, destined to any cantonment, port or encampment, to any point of export for movement thence to Europe, to any arsenal or navy yard, or material to any shipbuilding plant under contract to the United States Shipping Board for the sole purpose of constructing vessels for that Board.

(b) Other shipments for the United States Government, as the same may be authorized from time to time by the undersigned as necessary in particular cases, but only upon request of the United States Army, United States Navy or United States Shipping Board, through a designated officer or representative of the respective departments, located in Washington.

Clearing Up Congestion

Advices received here from the committee of railroad executives now engaged in managing the unified eastern railway systems indicate that excellent progress has been made in clearing up congestion east of Chicago. The routing of exports via southern lines and ports of exit has materially reduced the burden of the carriers serving munition plants east of Pittsburgh and several of the largest steel mills report increasing output as the result of a larger car supply. The release of large numbers of cars unloaded during the week has supplied increased rolling stock for the west-bound freight movement and the general distribution of food and other necessary commodities has steadily improved.

The Council of National Defense is seeking to allay the apprehensions of those interested in so-called non-essential industries concerning the policy that will be pursued by the recently organized Bureau of Manufacturing Resources. George N. Peek, just appointed chief of the bureau, has been designated as the "industrial representative" of the War Industries Board and, for the present, at least, the bureau organization will be held in abeyance, as it is intended to co-ordinate Mr. Peek's work closely with that of the board which exercises supreme authority over the industries contributing to the war. It will probably be a fortnight or more before Mr. Peek's staff will be selected and in the meantime his activities will be suggested by the developments in the enforcement of the preferential treatment outlined in Judge Lovett's latest priority order.

Special emphasis is placed by the Council of National Defense upon the fact that the policy of the new bureau will not contemplate an attack upon the industries of the country of minor importance from a war standpoint and that the project embodied in the recent recommendation of the railroad war board for an embargo upon some 500 products classed as non-essentials has been peremptorily rejected and will not be revived.

An important feature of the work of the Bureau of Manufacturing Resources will be the changing over of manufacturing plants from non-essential to essential lines of product. In the main, such changes will be entirely voluntary and already the Council of National Defense has on file applications from a large number of manufacturers who desire to take on war work in place of producing non-essential goods. It will require many weeks to survey these plants and devise methods for utilizing their facilities and in the meantime little progress is likely to be made in any other direction.

When changes now being effected by the new interests in the Pittsburgh Rolls Corporation of Pittsburgh are completed the company's plant will have a monthly capacity of 2000 tons of rolls. The plant is now running at the rate of 1300 tons monthly as compared with an average for the 10 months ended Oct. 31, last, of 1102 and an average for 1916 of 1048 tons.

The Jeanesville Iron Works, Hazleton, Pa., has issued a notice covering the discontinuance on Dec. 15 of the 10 per cent wage bonus system now operative. The employees will receive a flat advance in its stead.

